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## UPTAKE OF RADIONUCLIDES BY PLANTS

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## UPTAKE OF RADIONUCLIDES BY PLANTS

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## **PREFACE**

**This report summarizes research conducted by Stanford Research Institute under two contracts sponsored by the Office of Civil Defense. The experimental facilities were constructed and the experiments were conducted under Contract No. N228-(62479)65703 (OCD Work Unit No. 3143A), and the data analysis and correlation were performed under Contract No. N0022866C0347 (OCD Work Unit No. 3143B).**

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## INTRODUCTION

### Background

Evaluation of the biological consequences from ingesting radionuclides in foods depends first on a knowledge of the paths by which radionuclides enter the food chains and second on the availability of information about the uptake or assimilation processes. The two major paths of entry into food chains of plants are: (1) foliar contamination by deposited fallout particles followed by foliar absorption of soluble radionuclides and (2) uptake of radioelements by the plants through root assimilation. In both paths the biological availability of a given radioelement for uptake depends on its solubility in the aqueous media that is in contact with the plant tissues since transfer across plant membranes generally requires an ionic form.

The manner in which the solubility of the different radioelements depends on the conditions of fallout and the methods for relating plant contamination to gross fallout deposition levels are discussed in Reference 1; the fallout properties and the related solubility behavior of all the fission product radioelements are described in terms of a set of contour ratios that are defined as the ratio of a density factor for a given property of the fallout to the standard intensity in roentgens per hour at one hour. Use of the standard intensity as derived from fallout models--or from postattack monitoring data--would serve as input data for a systematic method of estimating or predicting the relative amount of each radioelement in the fallout that various food crops would assimilate.

The radiological hazard to humans and animals from food contaminated by fallout from a set of hypothetical nuclear attacks on the continental United States was recently evaluated in a study Stanford Research Institute conducted for the Office of Civil Defense, Department of Defense<sup>6</sup> using a series of newly developed models.<sup>1,2,3,4,5</sup> The conclusions of the study were derived from analyses of currently available data on direct plant-foliar contamination, the initial contamination of drinking water sources, and the uptake by plants through their root systems.

Analyses of available plant uptake data<sup>7</sup> indicated that additional experiments were needed to provide uptake contamination factors for many plants, fission product radionuclides, soil types, and plant age combinations. Experimental verification of these plant uptake contamination factors is needed to provide an improved technical basis for establishing

requirements for long term postattack countermeasures and for planning future postattack research program needs on the internal contamination problem and on the cycling of radionuclides in the food chain.

### Objective

The objective of this study was to measure experimentally the uptake of radionuclides by plants through their root systems and to evaluate the dependence of the contamination factors on such parameters as plant type, chemical element, soil type, soil additives, plant age, soil nutrients, and fallout solubility. To meet this objective the work was carried out in three phases.

The first phase consisted of a preliminary experiment to develop and proof test procedures to be used in the full scale investigations of the plant uptake contamination factors. This led to the second phase of designing and constructing experimental facilities for growing crops under as near field conditions as possible.

The third phase consisted of a full scale experiment to measure the effect of the following variables on the plant uptake contamination factor:

1. Soil texture (sand, loam, and clay)
2. Plant type (wheat, bean, carrot, tomato, lettuce, clover, and radish)
3. Radioelement (Sr, Zr, Cs, Ce, and Ru)
4. Plant age (weekly sampling, but depending on growth cycle)
5. Depth of mixing of radioelement in soil (8 inches)
6. Solubility of fallout simulant.

### Theory

Major factors that influence the uptake of radionuclides by plants through their root systems are:

1. Physicochemical properties of the ions of the radioelement
2. Plant species
3. Soil type and chemical characteristics
4. Soil management practices

Assimilation of nutrients or inorganic ions by roots of plants usually involve soluble, exchangeable ions in the soil. When new ions from a mineral fertilizer or from fallout particles are introduced into the soil, they compete with and replace other ions on available exchange sites in the soil. In some reactions with the soil, the new ions become non-exchangeable and, to the extent that these reactions occur in a soil, some portion of the radioelement becomes unavailable for uptake. Thus, the types of interactions that occur between the soluble radionuclides and soil constituents determine the availability of the radionuclides for uptake from the soil.

Soil management practices include the addition of organic matter, mineral fertilizers, and amendments (such as lime) to the soil, in addition to various cultivation techniques. These practices can influence the chemical composition of the plant.

Since the availability of a given radioelement for uptake from soil is generally related to the concentration of the exchangeable portion of the radioelement in soil, the foliage or plant part contamination factor is defined in terms of its concentration in soil rather than in terms of the deposition density per unit area. The plant part soil uptake contour ratio is given in Reference 4 by

$$UN_i^0 = N_i^0 (1 - a_L w_L) a_{SU} w_p / \rho D \quad \frac{\text{atoms in plant part}}{\text{square feet of soil area}} \quad (1)$$

in which

- $N_i^0$  is the number of soluble atoms per square foot of "open field" area of the  $i$ th nuclide corrected to detonation time;
- $a_{SU}$  is the plant uptake contamination factor, in atoms of  $i$ th nuclide in a plant part (atoms per gram of dry plant part) divided by the atoms of  $i$ th nuclide in soil (atoms per gram of soil);
- $w_p$  is the surface density of the plant part, in gram of dry plant part per square foot of soil area;
- $a_L$  is the foliage contamination factor in atoms per gram of dry foliage divided by the number of atoms per square foot of soil area;

$w_L$  is the foliage surface density in grams of dry foliage per square foot of soil area;

$\rho$  is the bulk density of the soil, in grams per cubic foot; and

$D$  is the depth of plowing in feet.

The term  $(1-a_L w_L)$ , is the fraction of  $N_1^0$  that is deposited on the soil; on bare soil,  $w_L$  is zero. The surface deposit density,  $(1-a_L w_L)N_1^0$ , divided by  $\rho D$  gives the effective concentration of the soluble radionuclide per gram of soil. The fraction of a radionuclide taken up by a plant part is given by  $a_{SU} w_p / \rho D$ .

The plant uptake contamination factor ( $a_{SU}$ ) depends on the various chemical equilibrium and exchange processes among the soil minerals, roots, and plant tissues. These experiments were concerned with the measurement of  $a_{SU}$ .

### Approach

The experimental techniques used to meet the objectives of this study were selected to reproduce, as closely as possible, the growth of food crops under actual field conditions. Wide coverage of crop-soil-radionuclide combinations was planned rather than less extensive, highly replicative measurements.

Table 1 outlines the crops, radionuclides, and soils studied. Details of the experimental approach and experimental procedures are further described in the following paragraphs.

### Radionuclides

Many radionuclides are produced in nuclear and thermonuclear explosions; of the fission products that present a potential long term hazard, the most important are strontium-90 and cesium-137. In the case of relatively shortlived radionuclides such as iodine-131, uptake through the root system is unimportant because radioactive decay reduces the concentration of the isotope while it is still in the soil.

Strontium-90, because of its relatively long half-life of 28 years and its appreciable yield in the fission process, accounts for a considerable fraction of the total activity of fission products that are several

Table 1

## EXPERIMENTAL OUTLINE

<u>Family</u>	<u>Common Name</u>	<u>Crop</u>
		<u>Plant Parts</u>
Gramineae	Wheat	Roots, stalks, leaves, <u>grain</u> <sup>a</sup>
Leguminosae	Kidney beans	Roots, stems, leaves, pods, <u>fruit</u>
Solanaceae	Tomato	Roots, stems, leaves, blossoms, <u>fruit</u>
Umbelliferae	Carrot	<u>Roots</u> , top
Cruciferae	Radish	<u>Roots</u> , top
Compositae	Lettuce	Roots, <u>leaves</u> , <u>head</u>
Leguminosae	Clover	Tops

Radionuclides

<u>Isotope</u>	<u>Half Life</u>
Sr-85	64 days
Zr-95-Nb-95	65 days-35 days
Ru-106	371 days
Cs-137	30 years
Ce-144	285 days

Soil Type

Oakley	sand
Pleasanton	loam
Clear Lake	clay

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a Plant part underlined indicates the primary part from standpoint of human ingestion.

years old. Strontium and calcium are divalent alkaline earth elements, and since calcium is essential to plant life, strontium competes with it for entry into the root system of plants. Not all calcium in soil is available for uptake through the root system because some natural calcium compounds in soil are insoluble and are not available as plant food until they have been converted into soluble compounds. For this reason it is desirable to relate the uptake of Sr-90 to the exchangeable calcium content of soils. It was assumed that plants cannot discriminate among the different isotopes of a chemical element. For this reason, and because of the desire to analyze the radioactivity in the plant samples by means of counting gamma activity, the isotope strontium-85 was used as the tracer for the radioelements of strontium to take advantage of counting the gamma activity of its 0.51 mev photon.

Cesium-137 has a radioactive half-life of 30 years and is of particular interest in fallout that is more than a year old because cesium is the principal constituent whose radioactive decay is accompanied by the emission of gamma rays. The chemical properties of cesium resemble those of potassium, another essential element in the nutrition of plants.

In these experiments, primary consideration was given to the study of the radionuclides of strontium and cesium. The study also included other radionuclides that would be present in fallout at later times such as ruthenium-106, cerium-144, and zirconium-niobium-95.

### Soils

Many types of soil exist in the United States because of the wide range of biological, geological, and climatological conditions.

Major classes in which soils are grouped on the basis of texture are gravel, sand, silt, and clay. In addition, the term loam is widely used for certain combinations of sand, silt, and clay. In soil classification for agricultural purposes, loam indicates a certain distribution of particle sizes.

Major elements recognized<sup>8</sup> as essential for plant growth are: carbon, hydrogen, oxygen, nitrogen, phosphorus, sulfur, potassium, calcium, and magnesium. Plants also need very small quantities of certain elements--the so-called trace or minor elements--for their nutrition, and these include iron, manganese, zinc, copper, molybdenum and boron. All are derived from soil except carbon, hydrogen, and oxygen, which the atmosphere supplies. The proportions of the exchangeable cations of these elements held by soil colloids have a controlling influence on soil fertility, soil reaction (pH), and soil structure.

Soils of dry regions normally have pH values of about 7 and the usual order of abundance of exchangeable cations in the soil is  $\text{Ca} > \text{Mg} > \text{K} > \text{Na}$ . Soils of humid regions usually have pH values below 7; and under conditions of extreme leaching, hydrogen may represent 90 percent or more of the total exchangeable cations. The usual order of abundance of exchangeable cations in humid regions is  $\text{H} = \text{Ca} > \text{Mg} > \text{K} > \text{Na}$ .

Soils selected for this study were a sand, a loam, and a clay, providing a range of chemical and physical properties that characterize typical agricultural soils in the United States.

### Crops

The crops studied in this experiment were selected according to importance in the U.S. diet and botanical specie. Major food items in the U.S. diet are listed in Table 2. The inclusion of meat and milk indicates the importance of animal fodder in the man-food-radionuclide chain. Table 3 gives yields of the important U.S. crops by botanical family.

Consideration of these factors led to the final selection of the seven crops listed in Table 4. One crop from each important botanical family is included, and the variety with respect to human diet includes a grain crop (wheat), a seed crop (beans), root crops (carrots and radishes), a leafy crop (lettuce), a fruit crop (tomatoes), and an animal fodder crop (clover).

### Growing Facilities

The growing facility envisioned in the initial planning stages of this research effort was a greenhouse in which crops could be grown under semicontrolled environmental conditions. This concept was abandoned, however, after greenhouse authorities disclosed the complexities and cost of maintaining suitable environmental conditions, i.e., humidity, temperature, filtered air. The advantages of simulating normal field conditions resulted in a decision to plant the crops in large containers outdoors during the normal growing season.

### Fallout Simulant

Fallout particles from a land surface nuclear explosion consist of fused, sintered, and unchanged grains of soil minerals and other materials present at the point of detonation. Analysis of fallout particles from

Table 2

CONSUMPTION OF MAJOR FOODS PER PERSON IN THE U.S.

Item	Table Weight (gm/day)
Wheat <sup>a</sup>	194
Potatoes	117
Sugar	81
Oranges	64
Fats and oils	58
Eggs	55
Tomatoes <sup>a</sup>	43
Sweet corn <sup>a</sup>	42
Beans <sup>a</sup>	34
Apples	29
Grains other than wheat	28
Lettuce <sup>a</sup>	23
Grapefruit	22
Melon	22
Cabbage	19
Peas	15
Onions	15
Peaches	14
Carrots <sup>a</sup>	13
Milk, all forms	633
Meat, poultry, fish	233

<sup>a</sup> Crops selected for study

Source: Agricultural Statistics, 1962,  
U.S. Department of Agriculture,  
U.S. Government Printing Office,  
Washington, D.C., 1963



Table 3  
YIELDS OF IMPORTANT U.S. CROPS  
1962

Botanical Classification		Fresh Yield (tons/acre)	Notes
<b>Leguminosae</b>			
Pea	<i>Pisum sativum</i>	1.0	Shelled
		2.5	In shell
Bean <sup>a</sup>	<i>Phaseolus vulgaris</i>	0.70	Dry
		2.5	Snap and wax
Soy bean	<i>Glycine max</i>	0.75	Beans
		2.5	Hay
White clover <sup>a</sup>	<i>Trifolium repens</i>	2.0	Hay
Alfalfa	<i>Medicago sativa</i>	2.3	Hay
<b>Gramineae</b>			
Sorghum	<i>Sorghum vulgare</i>	1.1	Grain
		2.0	Foliage
Corn	<i>Zea mays</i>	1.4	Grain
		1.75	Ears
Oats	<i>Avena sativa</i>	0.64	Grain
		2.0	Hay
Barley	<i>Hordeum vulgare</i>	0.75	Grain
Wheat <sup>a</sup>	<i>Triticum vulgare</i>	0.75	Grain
Timothy	<i>Phleum pratense</i>	2.0	Hay
<b>Chenopodiaceae</b>			
Sugar beet	<i>Beta vulgaris</i>	17.0	
<b>Amaryllidaceae</b>			
Onion	<i>Allium cepa</i>	13.0	Dry onions
<b>Cruciferae</b>			
Cabbage	<i>Brassica capitata</i>	16.0	
<b>Rosaceae</b>			
Apple	<i>Malus, mill</i>	0.145 <sup>b</sup>	
Peach	<i>Prunus persica</i>	0.048 <sup>b</sup>	
<b>Rutaceae</b>			
Orange	<i>Citrus sinensis</i>	0.125 <sup>b</sup>	

Table 3 (concluded)

<u>Botanical Classification</u>		<u>Fresh Yield (tons/acre)</u>	<u>Notes</u>
Umbelliferae			
Carrot <sup>a</sup>	Daucus carota	10.0	
Solanaceae			
Potato	Solanum tuberosum	9.6	
Tomato <sup>a</sup>	Lycopersicon esculentum	6.0	
Compositae			
Lettuce <sup>a</sup>	Lactuca sativa	9.0	

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a Crops selected to be studied

b Tons per tree

Source: Agricultural Statistics, 1962. U.S. Dept. of Agriculture,  
U.S. Government Printing Office, Washington, 1963

Table 4

## BOTANICAL CLASSIFICATION OF CROPS SELECTED FOR STUDY

Common Name	Class	Family	Species	Variety
Wheat	Monocotyledoneae	Gramineae	<i>Triticum aestivum</i>	Ramona 50
Kidney bean	Dictyledoneae	Leguminosae	<i>Phaseolus vulgaris</i>	Red Kidney
Tomato	Dictyledoneae	Solanaceae	<i>Lycopersicon esculentum</i>	Early Pack No. 7
Lettuce	Dictyledoneae	Compositae	<i>Lactuca sativa</i>	Great Lakes 118
Carrot	Dictyledoneae	Umbelliferae	<i>Daucus carota</i>	Long Imperator 58
Radish	Dictyledoneae	Cruciferae	<i>Raphanus sativus</i>	Red Giant
Rose clover	Dictyledoneae	Leguminosae	<i>Trifolium vepens</i>	Rose Clover

Source: Manual of Cultivated Plants, L. Bailey, MacMillan, 1949

surface and near-surface detonations at weapons tests in both Eniwetok Proving Ground and the Nevada Test Site show that the radioactive elements are either within the interior of fused and sintered particles or plated on the exterior of all three types of particles.

The fallout formation process consists of two distinct periods. In the first period, the condensation of volatile radioelements occurs by deposition onto and diffusion into large molten (soil) particles and by agglomeration of smaller particles. The radioelements thus condensed become fused within the volumes of the molten particles when they cool and solidify. In the second period, the remaining volatile radioelements condense onto the surface of relatively cool or solid particles. The fraction of a radioelement that condenses during the second period of formation is potentially soluble and biologically available for assimilation in plants. Radionuclides in worldwide fallout are quite soluble; however, limited data exist on nuclide solubility of local fallout. Because of the general lack of reliable solubility data on real fallout, models<sup>4</sup> were developed for estimating the potential solubility of the various radioelements carried by fallout particles. A study<sup>5</sup> to measure solubility and thus improve the input data for the solubility model is in progress.

The fallout simulant prepared for this study consisted of sized mineral particles with the radionuclides adsorbed on the particles from carrier solutions containing stable atoms of the major fission product elements. The adsorption process simulates the second period of the fallout formation process, making the adsorbed radionuclides available for uptake. Sufficient activity of one of the radioisotopes to ensure good counting rates in the harvested plant samples was added to this solution as a tracer for the radioelement of interest. The required concentrations of each radioisotope were determined in a set of preliminary plant uptake experiments. (See Appendix A).

The physical properties of particle size and deposited mass level for the fallout simulant were determined from the fallout models developed by Miller.<sup>1</sup> These models provide a means of estimating fallout particle size and deposited mass levels as functions of weapon yield, dose rate, and downwind distance. Clark<sup>10</sup> described these relationships in a form readily applicable for use in the design of realistic experiments using fallout simulants. For this experiment a deposited mass level of 24 grams per square foot and a particle size range of 88 to 177 microns were chosen. These relationships would result from a fallout event 90 miles downwind from a 14 MT land surface detonation. The chosen mass level of 24 grams per square foot resulted in a total of 175 grams (24 grams per square foot x 7.3 square feet) of fallout simulant required for each soil container.

### Soil Contamination

The contamination of soil by fallout particles is the first step in the process of uptake of radioelements by plants through their root system. The soluble radioelements are made available for uptake by (1) surface penetration with rain water or natural erosion processes and (2) mechanical mixing into the soil by cultivation processes. It was demonstrated<sup>11,12,13</sup> that fallout particles deposited on open land areas are not susceptible to any large degree of redistribution by wind and rain and, after several years of weathering, the particles remained within the top 1/4 to 1/2 inch of surface soil. The soluble radioelements that leach from the fallout particles deposited from land-surface detonations, either as local fallout or worldwide fallout, penetrate no more than 2 to 3 inches, even after eight years.<sup>14</sup> Mixing the fallout with the soil to the depth of cultivation, after a contaminating event, would result in a further penetration of the radioelements in the soil.

As plowing is probably the most extensive form of cultivation, many experiments studied the effectiveness of various depths of plowing. In most cases, little advantage was found for plowing to a depth greater than 6 to 8 inches. To simulate the mixing of fallout particles to a depth of cultivation, the fallout simulants prepared in this experiment were thoroughly mixed with the top eight-inch layer of soil in each container.

## EXPERIMENTAL PROCEDURES

A cooperative research effort between Stanford Research Institute and the U.S. Naval Radiological Defense Laboratory (USNRDL) was approved by the Commanding Officer and Director of USNRDL, thus making available their extensive field test facilities at Camp Parks near Pleasanton, California. The USNRDL facilities include hot cells for handling radioisotopes and large land areas with controlled access.

### Growing Facility

A 100- x 100-foot paved test area, enclosed with an eight-foot high solid board fence served as a growing facility for the root-uptake experiment. Figure 1 shows a view of the facility looking west. Electrical power, water, and lights were conveniently located within the area. A covered work space for plant handling and soil processing filled the west side. Laboratory bench tops and a sink that drained to a large stainless steel holding tank were provided for processing harvested plants. A large oven for drying the plants was located in the work area.

Redwood boxes, three feet on a side (soil surface area of 7.3 square feet) served as soil containers. Each box contained about one cubic yard of soil and the three-foot depth allowed the root system of most of the crops to develop about as they would under normal field conditions (at least during the seedlings' early growth stages).

Polyethylene sheeting lined the inside of each box, except the bottom, to prevent evaporation through the seams in the sides of the box. A 4-inch layer of pea gravel in the bottom of the boxes facilitated drainage of excess irrigation water. Galvanized trays beneath each box caught this water.

### Synthetic Fallout Production Facilities

One of the two hot cells provided adequate facilities for remote handling and preparation of synthetic fallout. This two-foot thick concrete cell is equipped with master-slave manipulators, a zinc bromide filled viewing window, and has provisions for ventilation through an absolute filter. A commercial Novo sieving machine, a crusher and pulverizer, large high temperature furnaces and many other necessary apparatuses are available as part of the hot cell facility.

Figure 1  
VIEW OF GROWING FACILITY LOOKING WEST



The synthetic fallout was analyzed in a field laboratory installed in an existing building near the growing facility. The laboratory was equipped with two Mettler Balances, Models B-7 and B-6, a Beckman pH meter, clinical centrifuge, and the necessary glassware for quantitative analytical work. A 4-pi gamma ionization chamber and a well-crystal scintillation counter were available for measuring gamma activity. The 4-pi gamma ionization chamber is an argon filled (600 psig at 70°F) steel ionization chamber 11 inches in diameter by 14 inches high, shielded with 3 inches of lead. The current that ionizing radiation produces in the chamber is read out on a micro-ammeter. The useful ionization current output ranges between  $4 \times 10^{-10}$  and  $3 \times 10^{-5}$  milliamps (ma). Readings are normalized to a standard response of  $5.60 \times 10^{-7}$  ma for 100 micrograms of radium.

The scintillation counter consisted of a 3- x 3-inch NaI crystal with a 1-1/4 x 2-inch deep well mounted on an EMI type 95788 3-inch multiplier phototube whose output was fed directly into a Systron model 1091-3 scaler. The scaler gate was controlled by a Nuclear Dual Timer. A John Fluke Model 412A high-voltage power supply provided dynode string voltage for the multiplier phototube. Shielding consisted of a lead cylinder 3 inches thick, 9 inches I.D. and 22 inches high. A 2-inch thick lead cover moved in and out to permit access to the well crystal.

Well crystal counts were corrected to a standard response by subtracting background and normalizing to a Cs-137 standard. Samples were counted for at least one minute or until the accumulated counts were at least five times the background counts per minute. Counting efficiency of the system was determined for each of the radioisotopes from aliquots that were assayed in the 4-pi ionization chamber.

The response of the 4-pi ionization chamber to many radioisotopes has been determined.<sup>15</sup> Table 5 gives the 4-pi ionization response and the well crystal efficiency for the radionuclides used in this experiment.

#### Synthetic Fallout Production

Sized mineral particles were radiotagged with a total carrier solution that contained a predetermined amount of one of the radionuclides.

Albite, which is a widely distributed variety of feldspar, was used as the mineral particle on which the radioelements were adsorbed. The albite was crushed, pulverized, and sieved to obtain the particle size range desired. Table 6 gives the particle size distribution as determined by mechanical sieving. Magnetic separation removed the ferrous



Table 3

RESPONSE OF 4-PI IONIZATION CHAMBER AND EFFICIENCY  
OF GAMMA SCINTILLATION SYSTEMS

Radionuclide	$\frac{ma}{d \cdot s^a}$	$\frac{c}{d^b}$
Sr-85	$4.61 \times 10^{-14}$	0.337
Zr-95-Nb-95	$13.02 \times 10^{-14}$	0.576
Ru-106-Rh-106	$2.70 \times 10^{-14}$	0.226
Cs-137	$5.94 \times 10^{-14}$	0.337
Ce-144-Pr-144	$0.978 \times 10^{-14}$	0.0036

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a    ma = milliamperes  
      d = disintegration  
      s = seconds  
      c = counts

**Table 6**  
**SIEVE ANALYSIS OF ALBITH**

<u>Tyler Standard Sieve No.</u>	<u>Mesh Opening (microns)</u>	<u>Percent Retained</u>
32	500	1.40
42	350	0.88
48	297	4.05
60	177	55.75
170	88	38.20
325	44	0.05
PAN	—	0.0

material that was introduced during the crushing and pulverizing operation.

The concentrations of the stable carriers in the tagging solutions are given in Table 7, as determined from estimates of the relative amounts of the fission products that were not condensed at the time at which the soil particles composing radioactive fallout solidified. Rare gases and elements with contributions less than one percent were not considered. Table 7 also lists the percent of the fission product contribution of the important elements and the non-condensed fraction of each element available for condensation in the second period of the fallout formation process.

Radioisotopes for this experiment were obtained from the Oak Ridge National Laboratory, and Table 8 lists the properties as described in their catalog.<sup>17</sup> The radiochemical purity of each radionuclide was verified by pulse height measurements on a single channel gamma analyzer and the total activity was determined by measurement in the 4-pi ionization chamber. The elemental contribution to the carrier solution from the radionuclide activity was computed and the results are shown in Table 9. The experimental concentration of Sr, Ru, and Cs was higher than that computed for real fallout as shown in Table 7; this could not be avoided, however, since the required gamma counting rates dictated the activity levels used in the experiments.

The sized albite particles were placed in a twin shell blender\* in the hot cell. Carrier solution, containing one of the radionuclides of interest, was sprayed on the particles as the blender rotated. A stream of hot air dried the tagged particles in the blender. An infra-red heat lamp directed onto the surfaces of the blender assisted in the drying. The particles were next weighed in plastic containers in 175-gram lots and transferred from the hot cell to the plant growing facility in a two-inch lead shielding container. A one-gram sample was taken from each 175-gram lot for radioactivity measurements in the standardized 4-pi ionization chamber.

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\* Manufactured by Patterson & Kelley Co., East Stroudsburg, Pennsylvania

Table 7

**NONCONDENSED CHEMICAL ELEMENT CONCENTRATIONS<sup>a</sup>  
USED IN CARRIER SOLUTIONS**

<u>Chemical Element</u>	<u>Fission Product<sup>b</sup> Contribution (percent)</u>	<u>Noncondensed<sup>c</sup> Fraction (percent)</u>	<u>Chemical Element Concentration (<math>\frac{\text{mole} \times 10^{11}}{\text{gram of fallout}}</math>)</u>
Br	1.65	99.2	1.08
Rb	4.69	97.5	3.03
Sr	8.42	49.3	2.75
Y	3.11	30.6	0.63
Mo	7.68	68.8	3.50
Te	1.55	65.4	0.67
Ru	1.83	60.3	0.73
Sb	3.65	92.9	2.25
Se	6.35	98.1	4.36
I	6.66	98.9	4.36
Cs	5.51	99.2	3.62
Ba	7.01	50.4	2.34
La	3.36	14.7	0.33

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a 60 seconds after 14-megaton burst with  $4 \times 10^{14}$  fission product atoms per gram of fallout

b Reference 15

c Reference 1

Table 8  
PROPERTIES<sup>a</sup> OF RADIONUCLIDES UTILIZED

Radionuclide	Radiological Half-Life <sup>b</sup>		Radiations Emitted (mev)				Chemical Form <sup>c</sup>
	Parent	Daughter	Parent		Daughter		
			Gamma	Beta	Gamma	Beta	
Sr-85	64 d		0.510	None	—	—	Sr(NO <sub>3</sub> ) <sub>2</sub> in HNO <sub>3</sub> solution Oxalate in oxalic acid solution
Zr-95-Nb-95	65 d	35 d	0.722	0.364(54%)	0.745	0.160	
			0.754	0.396(43%) 0.883(3%)			
Ru-106-Rh-106 <sup>d</sup>	371 d	30 s	None	0.039	0.513	2.0(3%)	RuCl <sub>3</sub> in Hcl solution
					0.624	2.44(12%)	
					0.87	3.1(11%)	
					1.045	3.53(68%)	
					1.55 2.41	other(6%)	
Cs-137-Ba-137 <sup>d</sup>	30 y	2.6 m	None	0.51(92%) 1.17(8%)	0.662	None	CsCl in Hcl solution
Ce-144-Pr-144 <sup>d</sup>	285 d	17.5 m	0.034	0.17(30%)	0.060	2.97(99%)	CeCl in Hcl solution
			0.054	0.35(70%)	0.696		
			0.081		1.5		
			0.100		2.19		
			0.134				

- a Data compiled from Reference 18  
b s = seconds; m = minutes; d = days; y = years  
c As received from Oak Ridge National Laboratory  
d Parent radionuclide only will be listed in subsequent tables

Table 9

## CONCENTRATION OF TRACER RADIONUCLIDES IN FALLOUT SIMULAN

<u>Radio- nuclide</u>	<u>Tracer Activity (mc/gm)<sup>a</sup></u>	<u>Specific Activity (c/gm)<sup>b</sup></u>	<u>Concentration<sup>c</sup></u>
Sr-85	$1.21 \times 10^{-2}$	6.85	$2.08 \times 10^{-8}$
Zr-95-Nb-95	$6.74 \times 10^{-2}$	Carrier free	$2.70 \times 10^{-12}$
Ru-106	$1.56 \times 10^{-2}$	Carrier free	$1.84 \times 10^{-10}$
Cs-137	$5.16 \times 10^{-2}$	Carrier free	$1.31 \times 10^{-9}$
Ce-144	$4.24 \times 10^{-2}$	Carrier free	$9.26 \times 10^{-11}$

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a Millicuries per gram

b Curies per gram

c Moles nuclide per gram albite

## Soil

With the cooperation of the U.S. Soil Conservation Office, suitable deposits of each type of soil were located in the local area and arrangements were made with the land owners for the purchase of 60 tons of each type of soil.

At each site, after removing excess vegetation, the required quantities of each soil type were excavated from the surface layer 6 inches to 8 inches deep, and transported to the plant uptake growing facility.

Table 10 lists a description of the test soils and where each was obtained. A local nursery supplied a small quantity of soil Number 4 for use in preliminary experiment (See Appendix A). Samples of each soil were sent to commercial soil testing laboratories for chemical analysis. Tables 11 and 12 list the results of these analyses.

Each box was filled with a specified soil to within 10 inches of the top. The soil was tamped and moistened during the filling process to approximate its original field compactness. The filled boxes were then arranged within the test area as shown in Figure 2. These factors determined the box arrangement: (1) boxes containing the same radionuclide were kept together to prevent cross contamination among different radionuclides; (2) similar crops within each row were placed adjacent to each other to facilitate planting and maintenance; (3) a 10-foot aisle between rows was provided for moving boxes with a fork lift, and (4) boxes were placed to minimize the effect of the shadow line of fences.

## Soil Contamination

Mixing the tagged particles in the 8-inch depth of cultivation was accomplished by placing 450 pounds of a soil type into a modified concrete mixer (Figure 3) and adding the 175 grams of tagged particles (synthetic fallout). Twenty minutes of mixing was adequate to blend the tagged particles with the soil. The blended mixture was then dumped into hoppers for transfer to the soil boxes. Table 13 is a summary of the fallout simulant preparation. Radioisotopes were processed separately and the mixing equipment was thoroughly decontaminated before changing radioisotopes.

The 450-pound batch of tagged soil was tamped into an appropriate soil box to an 8-inch layer, to simulate an 8-inch depth of cultivation. After each box was filled with its soil-simulant mixture, it was heavily watered and covered with plastic (Figure 4) to prevent wind erosion.

Table 10

## DESCRIPTION OF TEST SOILS

Soil Number	Location	Soil Series	Soil Texture <sup>a</sup>	Mechanical Analysis <sup>b</sup>			Organic Material <sup>b</sup> (percent)
				Size Classes			
				Sand	Silt	Clay	
1	California; Contra Costa County, 2 miles west of Antioch	Oakley	Sandy loam	73.5	18.4	8.1	0.15
2	California; Alameda County, 1 mile north of Pleasanton	Pleasanton	Loam	29.8	45.5	24.7	2.15
3	California; Alameda County, 3 miles north of Livermore	Clear Lake	Clay	19.0	25.3	55.7	1.75
4	Nursery stockpile	--	Sandy clay Loam	58.4	22.4	19.2	4.00

<sup>a</sup> As described by U.S. Soil Survey Textural Classification Triangle

<sup>b</sup> Analysis performed by Nelson Laboratories, 1145 West Fremont Street, Stockton, California



Table 11

CHEMICAL COMPOSITION OF TEST SOILS<sup>a</sup>

Soil Number	Soil Texture	Cation Exchange Capacity <sup>b</sup> (meq/100 gm)	Extractable Cations <sup>c</sup> (meq/100 gm)				pH	
			Ca	Mg	Na	K	Soil Paste	Soil Water
1	Sandy loam	4.25	3.2	1.55	0.12	0.09	6.7	6.42
2	Loam	12.72	9.67	5.29	0.50	0.31	6.85	6.97
3	Clay	38.75	19.12	14.86	2.02	0.47	7.5	7.4
4	Sandy clay loam	15.50	16.3	3.7	0.95	0.31	6.1	6.2

	Saturation Extract Soluble <sup>f</sup> meq/l <sup>d</sup>						Total (percent of dry soil)		
	Ca	Mg	Na	HCO <sub>3</sub>	B	SO <sub>4</sub>	CO <sub>3</sub>	Cl	P
1	2.5	1.75	1.22	1.87	0.18	39.4	trace	38.0	0.01
2	3.98	4.10	10.26	3.4	1.06	100.0	trace	122.0	0.125
3	0.62	0.60	5.04	4.37	0.46	32.5	trace	63.0	0.075
4	73.2	31.6	17.04	2.5	1.05	207.5	trace	760.0	0.24

<sup>a</sup> Analysis performed by Nelson Laboratories, 1145 West Fremont Street, Stockton, California.

<sup>b</sup> Milliequivalent (meq) per 100 grams of soil, ammonium acetate extractable.

<sup>c</sup> Determined from Standard Procedures given by Chapman, H. P., and Pratt, P. F. Methods of

Analysis for Soils, Plants, and Waters, University of California, Division of Agricultural Sciences, 1961.

<sup>d</sup> Milliequivalent per liter saturated extract.

<sup>e</sup> Parts per million of saturated extract of soil.

<sup>f</sup> Determined from Standard Procedures given by Ribble and Quick, Tentative Methods of Analysis for Diagnostic Purposes, Water, Soil and Plants, University of California, Agricultural Extension.

Table 12

SPECTROGRAPHIC ANALYSIS OF TEST SOILS<sup>a</sup>

Soil No.	Soil Texture	Weight Percent of Element as Oxide									
		Si	Al	Na	K	Ti	Mn	Fe	Mg	Cr	
1	Sandy loam	70.24	15.00	2.75	2.50	0.50	0.07	3.50	2.25	0.025	
2	Loam	69.01	15.00	2.50	3.00	0.70	0.10	4.00	4.00	0.03	
3	Clay	71.35	15.00	2.25	1.50	0.80	0.15	4.00	2.75	0.02	
Soil No.	Texture	V	Cu	Ca	Zr	Ni	Co	Sr	Sn	Ba	
1	Sandy loam	0.008	0.003	3.00	0.015	0.005	0.001	0.05	0.002	0.08	
2	Loam	0.015	0.008	1.50	0.010	0.02	0.002	0.015	0.002	0.08	
3	Clay	0.02	0.015	2.00	0.015	0.01	0.003	0.03	0.002	0.08	

<sup>a</sup> Analysis performed by American Spectrographic Laboratories, Inc., 557 Minna Street,  
San Francisco, California

Figure 2

ARRANGEMENT OF SOIL CONTAINERS IN TEST AREA

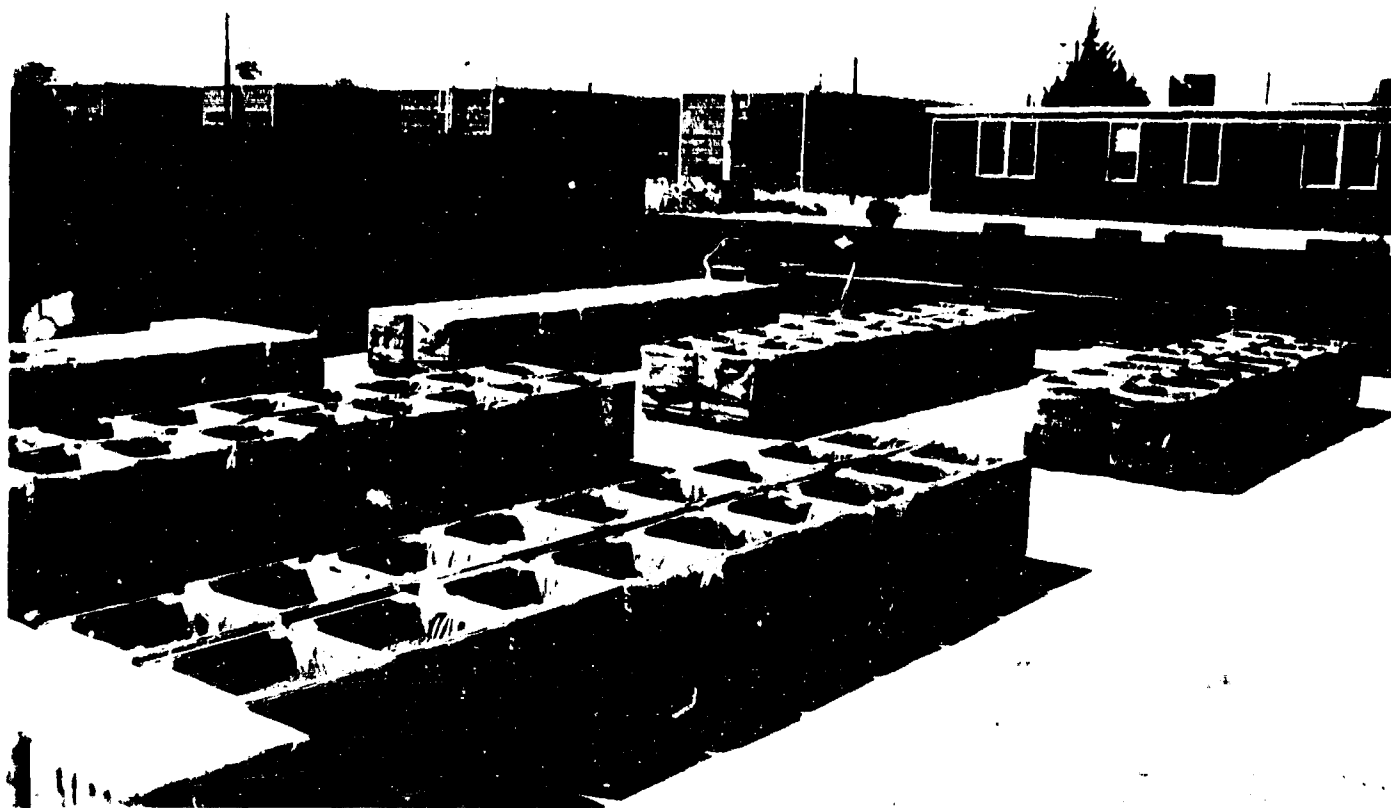


Figure 3

MODIFIED CONCRETE MIXER USED TO MIX SYNTHETIC FALLOUT WITH SOIL

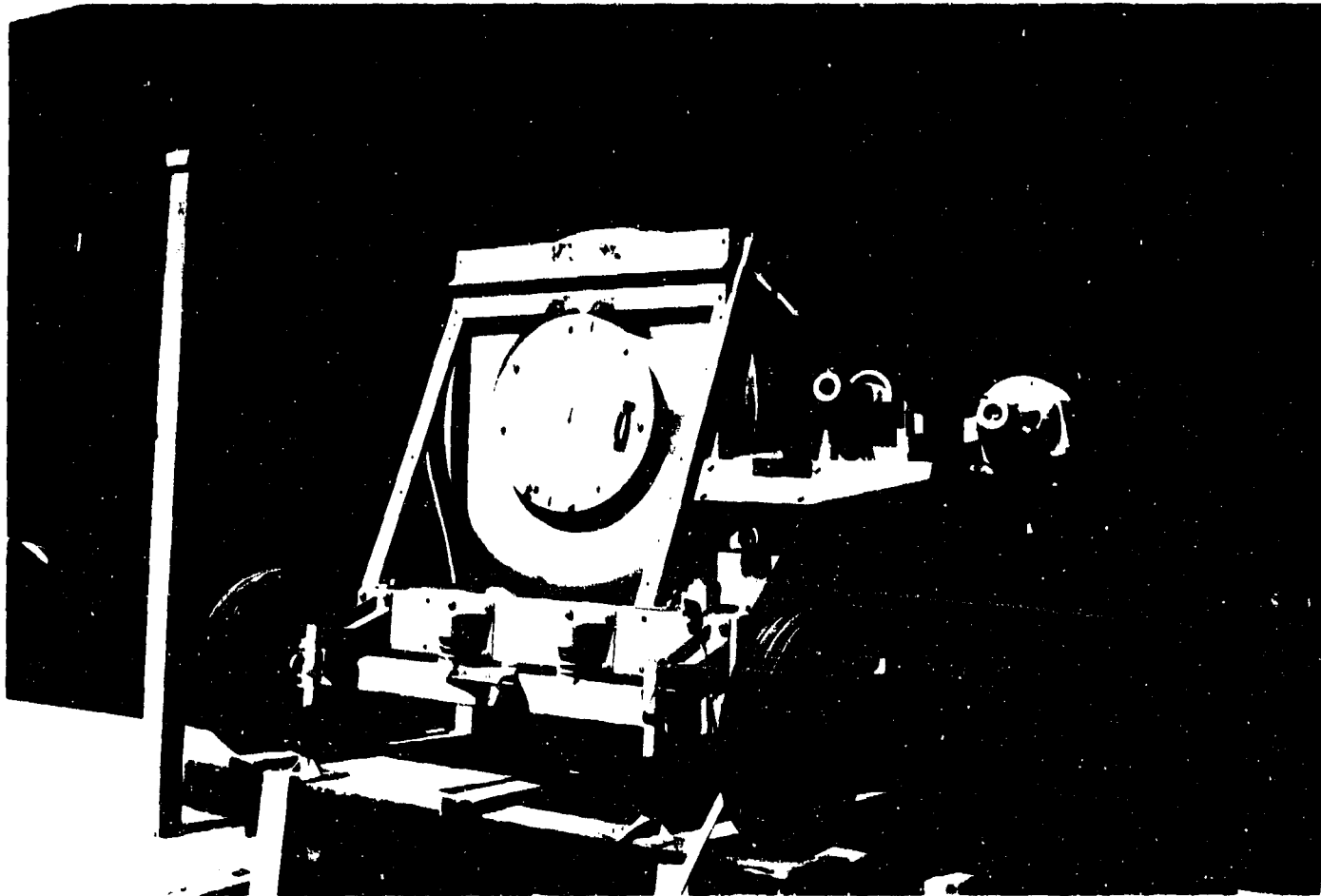


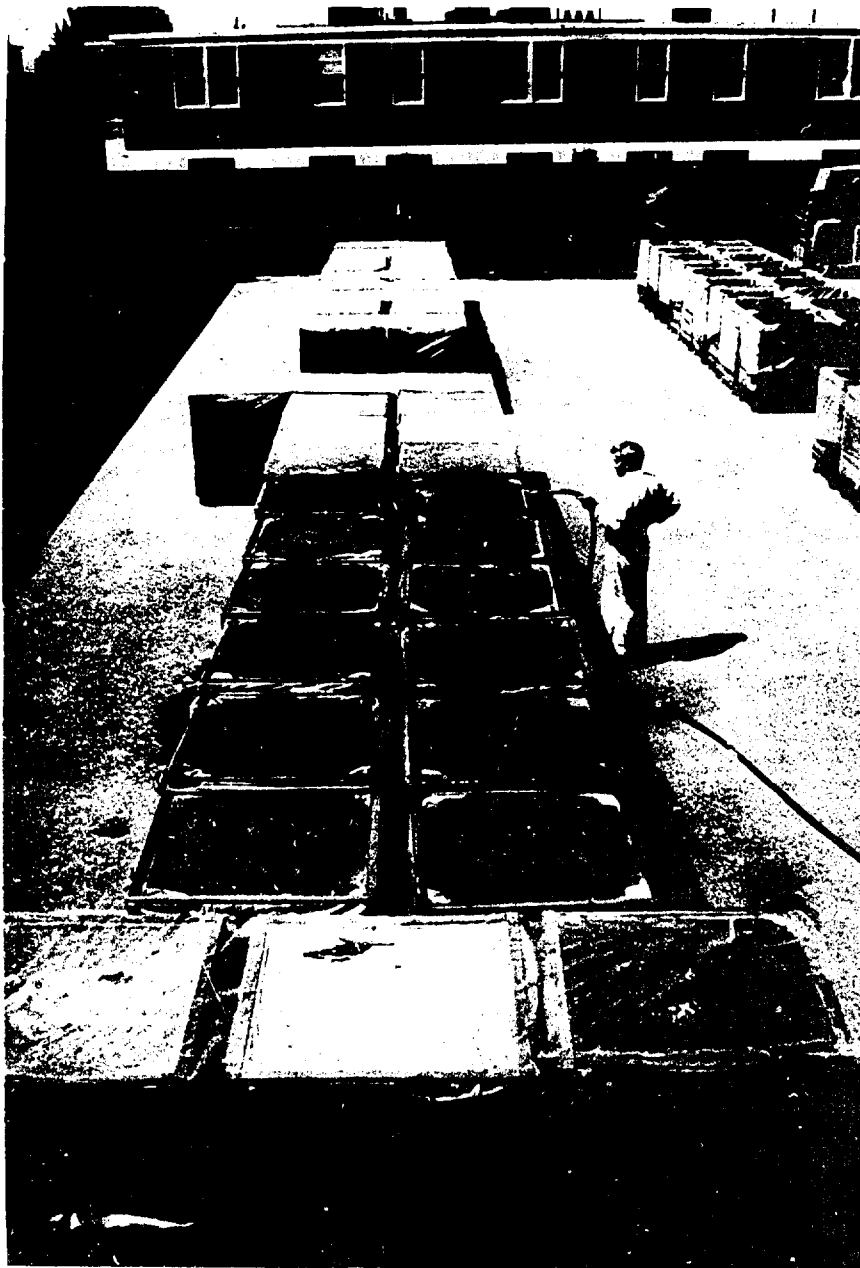
Table 13

## SUMMARY OF FALLOUT SIMULANT PREPARATION

<u>Date Simulant Prepared</u>	<u>Radioisotope</u>	<u>Albite Particles (gm)</u>	<u>Number of Soil Boxes Prepared</u>			
			<u>Sand</u>	<u>Loam</u>	<u>Clay</u>	<u>Total</u>
July 2, 1965	Ce-144	3685	6	6	6	18
July 7, 1965	Ru-106	2400	6	6	0	12
July 12, 1965	Zr-95-Nb-95	2400	6	6	0	12
July 14, 1965	Cs-137	5200	6	14	6	26
July 22, 1965	Sr-85	6000	6	22	6	34
	Controls		6	6	6	18
						120

Figure 4

SOIL CONTAINERS BEING WATERED PRIOR TO PLANTING  
AFTER WATERING, CONTAINERS WERE COVERED WITH PLASTIC



In addition to the three exchangeable calcium contents of the natural soils, intermediate calcium values were obtained by adding an agricultural gypsum\* to the as-received loam (Soil No. 2, Table 3). The exchangeable calcium content of 9.67 meq per 100 grams of soil was adjusted with gypsum to yield the values in Table 14. These additions yielded calcium concentrations of 25, 50, 100 and 200% greater than the calcium levels of the native soils.

The amount of agricultural gypsum calculated for each additional calcium level was added to the soil along with the fallout simulant to ensure blending.

A commercial fertilizer (Loamite) with a fertilizer ratio\*\* of 2-6-2 was also added to all soils during the mixing of the soil and fallout simulant. The recommended rate of application for the crops and soils used was 750 pounds per acre, or 0.125 lbs. for the 7.3 square foot soil surface in each box.

A box for each crop-soil combination was also prepared without the synthetic fallout addition as a control.

#### Planting Procedures

The planting procedures were chosen to allow the crops to grow as near actual field conditions as possible. Depth of planting, row spacing, and crop density were determined after consulting with personnel from the College of Agriculture, University of California, Davis, California. Table 15 lists these factors for each of the crops planted. Some characteristics of the selected crops such as climatic requirements, soil preferences, and growth habits are given in Table 16.

Certified seeds of each crop were obtained to ensure trueness to type and to eliminate the possibility of seed-borne diseases. The Agricultural Experiment Station, University of California College of Agriculture, Davis, California, provided certified seeds of field crops (wheat, beans, and clover), and Ferry-Morse Seed Company, Mountain View, California, provided certified seeds of vegetable crops (carrots, tomatoes, lettuce, and radishes). Sufficient quantities of each type of seed were obtained to allow successive plantings.

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\* Chemical form - calcium sulfate dihydrate -  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

\*\* Fertilizer ratio is the proportion of the three principal nutrients in a mixed fertilizer, namely phosphoric acid, nitrogen, and potash.

Table 14

## CALCIUM ADDITIONS TO SOIL NO. 2

<u>Box Number</u>	<u>Additional Calcium<sup>a</sup></u>		<u>Exchangeable<sup>b</sup> Calcium Level</u>
	<u>percent</u>	<u>grams</u>	<u>meq/100 gm soil</u>
60	25	441	12.12
61	50	883	14.55
115	100	1,775	19.40
116	200	3,540	38.80

---

a Molecular weight of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  - 172.17, 97 percent purity

b 1 meq/100 gram = 0.20 mg/gram soil



Table 15

## PLANTING PROCEDURES

<u>Crop</u>	<u>Depth of Planting (inches)</u>	<u>Number of Rows</u>	<u>Row Spacing (inches)</u>	<u>Thinned Plant Spacing (inches)</u>
Wheat	1-1/2	5	6	2
Tomatoes	1	2	12	4 plants/box
Beans	1-1/2	3	12	6
Lettuce	1/4	3	12	6
Carrots	1/4	5	6	2
Radishes	1/4	5	6	2
Clover	Sprinkled lightly over surface, covered with fine layer of soil			

Table 16

## CHARACTERISTICS OF SELECTED CROPS

Crop	Type and Source	Climatic Requirements	Soil Preference	Growth Habit	Seed Lot No.
Tomato	Early Pack No. 7, Select Grade, Ferry Morse Seed Co.	A warm season plant requiring a relatively long season to produce large yields. A tender crop that will not withstand a hard freeze	Grown on nearly all soils from the sands to heavy clays. A well drained soil is essential for high production. Important that soil be moisture-retentive	90-120 days to full mature stage, depends on length of growing season	10420-17126
Lettuce	Great Lakes 118 head lettuce, Ferry Morse Seed Co.	Thrives best in a fairly cool growing season. Temperature and moisture are important for high production	Grown on practically all kinds of soils from clay loams to sandy loams and muck. Soil should be well drained but moisture-retentive	60-150 days for full maturity according to soil and climatic conditions	10200-18632
Carrot	Long Imperator 58, Ferry Morse Seed Co.	Since plant is hardy, crop is planted under many climatic conditions. Exposure to relatively low temperatures is important during early stages of growth	Thrives best in deep, loose, loamy soil. Does not grow well on a soil that is highly acid	120-150 days for growth to full maturity	144422-12143
Radish	Scarlet Globe, Ferry Morse Seed Co.	Similar to carrot in that it is a hardy crop and can be grown under many climatic conditions; since it is a quick maturing crop, it does not thrive well in hot weather	Grown on all types of soil, but a light, friable soil is considered best	3-6 weeks from time of seed sowing	G2G
Bean	Red Kidney Bean, U.C. Agricultural Experiment Station	Plant is tender to frost and is usually planted in spring; with irrigation can be grown in arid regions	Grown on practically all types of soil from light sandy loams to heavy clays	60-90 days until pods are fully matured and have turned yellow	60-63
Wheat	Romana-50, U.C. Agricultural Experiment Station	Grown under widely varying climatic conditions	Thrives best on well drained, medium to heavy loams. Does not do well in sandy soils	80-90 days to full maturity.	63-64
Clover	Rose Clover, U.C. Agricultural Experiment Station	Does not stand severe winters, likes cooler moist regions	Thrives well on sand and sandy loam soil	60-90 days to first cutting, then can be harvested every 30-45 days	62-63

Source: Vegetable Crops, by Haner C. Thompson, Published by McGraw Hill Book Co., Inc., Fourth Edition, 1949.

All crops were grown from seed. At planting time the top 2-inch layer of soil in each box was cultivated to provide suitable conditions for seed germination. When the surface of the clay and loam soils became abnormally hard and cracked when dry, an organic humus was mixed into the top two-inch layer of soils.

Table 17 presents a planting summary listing all boxes planted and the radioisotope-crop-soil combination in each box.

Since carrot seeds germinate slowly, radish seeds were sown with the carrot seeds at the end of each row to mark the rows so that cultivation could begin soon after planting.

A commercial nursery\* provided the routine care required to ensure proper growth of the plants. This included watering, cultivating, fertilizing, and spraying for insect control as required.

#### Sample Identification

The soil boxes were assigned a number to identify with a crop-soil-radionuclide combination. (Table 17.) With the box number as the prefix, successive samples from that box were numbered serially by the last two digits. Thus, sample 104 indicated the fourth sample from box number 1; sample 11518 indicated the 18th sample from box number 115. Plant parts were assigned separate numbers.

#### Plant Sampling and Analysis

Plant sampling started soon after the plants emerged from the ground and continued at frequent intervals thereafter (at least seven days between samples), depending on the growth characteristic of the plant. The frequent sampling facilitated the thinning process that is usually required. When the plants were thinned to the desired spacings, sampling intervals were lengthened to ensure sufficient samples at harvest time. Sampling procedures depended on the type and age of plant. Table 18 summarizes the plant parts sampled at each stage of growth. In the early stages, the whole plant was sampled; however, when the root system developed, the plant stalk was cut off above soil level to avoid disturbing the soil around adjacent plants. During final harvest, the roots of several plants were analyzed.

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\* Pleasanton Nursery, 3654 South Rita Road, Pleasanton, California

Table 17  
PLANTING SUMMARY

<u>Box No.</u>	<u>Crop</u>	<u>Isotope</u>	<u>Soil</u>	<u>Planting Date</u>
1	Clover	Ce-144	Clay	7/8
2	Clover	Ce-144	Sand	7/8
3	Clover	Ce-144	Loam	7/8
4	Tomatoes	Ce-144	Loam	7/8
5	Tomatoes	Ce-144	Sand	7/8
6	Tomatoes	Ce-144	Clay	7/8
7	Beans	Ce-144	Clay	7/8
8	Beans	Ce-144	Sand	7/8
9	Beans	Ce-144	Loam	7/8
10	Clover	Control	Sand	7/23
11	Clover	Control	Loam	7/23
12	Beans	Control	Sand	7/8
13	Beans	Control	Clay	7/15
14	Beans	Control	Loam	7/15
15	Clover	Ru-106	Loam	7/8
16	Clover	Ru-106	Sand	7/8
17	Beans	Ru-106	Sand	7/8
18	Beans	Ru-106	Loam	7/8
19	Wheat	Ru-106	Loam	7/8
20	Wheat	Ru-106	Sand	7/8
21	Lettuce	Control	Loam	7/15, 8/17
22	Lettuce	Control	Sand	7/8
23	Lettuce	Ce-144	Clay	7/8
24	Lettuce	Ce-144	Sand	7/8
25	Lettuce	Ce-144	Loam	7/8, 8/16
26	Carrots	Ce-144	Loam	7/8, 8/16
27	Carrots	Ce-144	Sand	7/8
28	Carrots	Ce-144	Clay	7/8
29	Wheat	Ce-144	Clay	7/8
30	Wheat	Ce-144	Sand	7/8
31	Wheat	Ce-144	Loam	7/8
32	Clover	Control	Clay	7/8
33	Tomatoes	Control	Clay	7/8
34	Tomatoes	Control	Sand	7/8
35	Tomatoes	Control	Loam	7/23
36	Carrots	Ru-106	Loam	7/8
37	Carrots	Ru-106	Sand	7/8
38	Lettuce	Ru-106	Sand	7/8
39	Lettuce	Ru-106	Loam	7/8, 8/16
40	Tomatoes	Ru-106	Loam	7/8, 8/16
41	Tomatoes	Ru-106	Sand	7/8
42	Lettuce	Control	Clay	7/8
43	Beans	Zr-Nb-95	Loam	7/15

Table 17 (continued)

<u>Box No.</u>	<u>Crop</u>	<u>Isotope</u>	<u>Soil</u>	<u>Planting Date</u>
44	Beans	Zr-Nb-95	Sand	7/15
45	Wheat	Zr-Nb-95	Sand	7/15
46	Wheat	Zr-Nb-95	Loam	7/15
47	Tomatoes	Zr-Nb-95	Loam	7/15
48	Tomatoes	Zr-Nb-95	Sand	7/15
49	Tomatoes	Cs-137	Sand	7/15
50	Tomatoes	Cs-137	Clay	7/15
51	Tomatoes	Cs-137	Loam	7/15
52	Beans	Cs-137	Loam	7/15
53	Beans	Cs-137	Sand	7/15
54	Beans	Cs-137	Clay	7/15
55	Wheat	Cs-137	Clay	7/15
56	Wheat	Cs-137	Sand	7/15
57	Wheat	Cs-137	Loam	7/15
58	Wheat	Cs-137	Loam	7/15
59	Wheat	Cs-137	Loam	7/15
60	Wheat	Cs-137	Loam	7/15
61	Wheat	Cs-137	Loam	7/15
62	Carrots	Control	Clay	7/15
63	Carrots	Control	Sand	7/15
64	Carrots	Zr-Nb-95	Loam	7/15
65	Carrots	Zr-Nb-95	Sand	7/15
66	Lettuce	Zr-Nb-95	Sand	7/15
67	Lettuce	Zr-Nb-95	Loam	7/15, 8/16
68	Clover	Zr-Nb-95	Loam	7/15
69	Clover	Zr-Nb-95	Sand	7/15
70	Clover	Cs-137	Sand	7/15
71	Clover	Cs-137	Clay	7/15
72	Clover	Cs-137	Loam	7/15
73	Lettuce	Cs-137	Loam	7/15, 8/17
74	Lettuce	Cs-137	Sand	7/15
75	Lettuce	Cs-137	Clay	7/15
76	Carrots	Cs-137	Clay	7/15
77	Carrots	Cs-137	Sand	7/15
78	Carrots	Cs-137	Loam	7/15, 8/17
79	Carrots	Cs-137	Loam	7/15, 8/17
80	Carrots	Cs-137	Loam	7/15, 8/17
81	Carrots	Cs-137	Loam	7/15, 8/17
82	Carrots	Cs-137	Loam	7/15, 8/17
83	Carrots	Control	Loam	7/15, 8/17
84	Clover	Sr-85	Loam	7/23, 8/17
85	Clover	Sr-85	Clay	7/23
86	Clover	Sr-85	Sand	7/23
87	Tomatoes	Sr-85	Sand	7/23
88	Tomatoes	Sr-85	Loam	7/23

Table 17 (concluded)

<u>Box No.</u>	<u>Crop</u>	<u>Isotope</u>	<u>Soil</u>	<u>Planting Date</u>
89	Tomatoes	Sr-85	Clay	7/23
90	Lettuce	Sr-85	Clay	7/23
91	Lettuce	Sr-85	Sand	7/23
92	Carrots	Sr-85	Sand	7/23
93	Carrots	Sr-85	Loam	7/23
94	Carrots	Sr-85	Loam	7/23
95	Carrots	Sr-85	Clay	7/23
96	Wheat	Sr-85	Clay	7/23
97	Wheat	Sr-85	Sand	7/23
98	Wheat	Sr-85	Loam	7/23
99	Wheat	Sr-85	Loam	7/23
100	Wheat	Sr-85	Loam	7/23
101	Wheat	Control	Clay	7/23
102	Wheat	Control	Sand	7/23
103	Beans	Sr-85	Sand	7/23
104	Beans	Sr-85	Clay	7/23
105	Beans	Sr-85	Loam	7/23
106	Lettuce	Sr-85	Loam	7/23, 8/17
107	Lettuce	Sr-85	Loam	7/23, 8/17
108	Lettuce	Sr-85	Loam	7/23, 8/17
109	Lettuce	Sr-85	Loam	7/23, 8/17
110	Lettuce	Sr-85	Loam	7/23, 8/17
111	Carrots	Sr-85	Loam	7/23
112	Carrots	Sr-85	Loam	7/23
113	Carrots	Sr-85	Loam	7/23
114	Wheat	Sr-85	Loam	7/23
115	Wheat	Sr-85	Loam	7/23
116	Wheat	Sr-85	Loam	7/23
117	Wheat	Sr-85	Loam	7/23
118	Wheat	Sr-85	Loam	7/23
119	Wheat	Sr-85	Loam	7/23
120	Wheat	Control	Loam	7/23

Generally in the sampling process the washing of the plants was minimized to avoid the possible loss of soluble radionuclides. Therefore, care was taken to ensure the removal of all soil particles from the sampled plants. Consequently, the root crop plants--carrots and radishes were thoroughly washed to remove soil particles. A portion of each carrot crop was peeled after washing and the peel and meat portions analyzed separately.

After harvesting and washing, plants were separated into parts as indicated in Table 18. Plant parts were put into separate plastic containers and placed in a large forced air drying oven for a minimum of 24 hours at 70°C,\* or longer if required, to yield a constant weight.

Plant samples were transferred from the large drying oven in the growing facility to a smaller oven in the laboratory. Samples were removed from the oven, cooled and weighed immediately on a semi-micro balance (Mettler Model B-6).

To ensure good counting efficiency in the well crystal, plant material was compressed in "Nalgene" test tubes. Sample depth was limited to 1-1/2-inch so that the radioactive material was below the surface of the well crystal. Up to 10 grams of plant material could be counted in this manner. Samples were counted for at least one minute or until their total count exceeded five times the background counts per minute.

#### Climatological Measurements

Climatological measurements in the plant growing facility during the experiment included: (1) a continuous recording of temperature and humidity, with a U.S. Weather Bureau recording hygrothermograph exposed in a standard Instrument Shelter; and (2) a measure of precipitation with a standard U.S. Weather Bureau rain and snow gauge. The USNRDL also continuously recorded wind speed and direction near the facility.

Daily recorded maximum and minimum temperatures and relative humidity over the time span of the experiment are given in Table B-1, Appendix B. The time of the readings is also included. A total of 3.79 inches of rainfall fell during the growing of the crops as shown in Table B-1.

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\* Association of Official Agricultural Chemists, 12.2 p. 116, 1945

Table 18

## SUMMARY OF PLANT PARTS SAMPLED

<u>Plant</u>	<u>Plant Age (days)</u>	<u>Sampled Part</u>
Bean	11-36	Shoot
	27-55	Leaves, stem
	40-70	Leaves, stems, blossom, pod
	61-92	Leaves, stem, pod, fruit
	81-118	Leaves, stem, pod, fruit, root
Carrot	29-63	Shoot
	40-74	Whole
	47-154	Top, root
	115-154	Top, root, meat, peel
Radish	11-15	Whole
	20-36	Top, root
Clover	24-54	Whole
	42-167	Top
Lettuce	27-43	Shoot
	25-81	Leaves
	81-130	Leaves, head
	47-148	Leaves, head, root
Tomato	15-49	Shoot
	35-70	Top
	41-99	Leaves, stem
	55-137	Leaves, stem, blossom
	67-130	Leaves, stem, blossom, fruit
	98-137	Leaves, stem, blossom, fruit, root
Wheat	11-32	Shoot
	24-48	Stalk
	42-80	Stalk, head
	80-104	Stalk, head, leaves, root



Table 19

## AVERAGE SYNTHETIC FALLOUT AND CONTAMINATED SOIL ACTIVITY

Radionuclide	Well Crystal Response (c/d)	Synthetic Fallout Activity 4 <sup>r</sup>				Contaminated Soil Activity	
		(ma/gm)	Response (ma/d/s)	(d/s/gm)	(c/m/gm)	Soil Dry Weight (gm)	(c x gm)
Sr-85	0.337	$207 \times 10^{-10}$	$4.61 \times 10^{-14}$	$44.9 \times 10^4$	$90.8 \times 10^5$	$15.9 \times 10^8$	$1.98 \times 10^5$
Cs-137	0.337	$113 \times 10^{-9}$	$5.94 \times 10^{-14}$	$19.1 \times 10^5$	$38.6 \times 10^6$	$67.6 \times 10^8$	$1.98 \times 10^5$
Zr-95-Nb-95	0.576	$324 \times 10^{-9}$	$1.30 \times 10^{-13}$	$24.9 \times 10^5$	$86.0 \times 10^6$	$15.1 \times 10^9$	$1.98 \times 10^5$
Ru-106	0.226	$158 \times 10^{-10}$	$2.70 \times 10^{-14}$	$57.6 \times 10^4$	$78.1 \times 10^5$	$13.7 \times 10^8$	$1.98 \times 10^5$
Ce-144	0.0936	$153 \times 10^{-10}$	$9.78 \times 10^{-15}$	$15.7 \times 10^5$	$88.5 \times 10^5$	$15.4 \times 10^8$	$1.98 \times 10^5$

$$\frac{\text{atoms / gm of dry plant}}{\text{atoms / gm of dry soil}} = \frac{\text{d/s / gm of dry plant}}{\text{d/s / gm of dry soil}} = \frac{\text{c/m / gm of dry plant}}{\text{c/m / gm of dry soil}}$$

Units of c/m / gm were used to calculate the  $a_{\text{SU}}$  values reported herein.

Appendix D presents a summary sheet for each soil container. Information in each summary sheet includes (1) plant age in days from date of planting, (2) total sample weight, (3) number of plants harvested, (4) grams per plant, (5) grams of plant counted, (6) the plant activity, and (7) uptake contamination factors ( $a_{\text{SU}}$ ) for each plant harvested. Soil activity, date of planting, and plant emergence date are also listed for each soil container.

#### Computed Values of $a_{\text{SU}}$ at Crop Maturity

The  $a_{\text{SU}}$  values derived for each plant part-soil-radionuclide combination at crop maturity are listed in Tables 20 through 26. Values of  $a_{\text{SU}}$  were calculated for the plant samples obtained at the final harvest date when the edible portion for each crop had reached the marketable stage of growth.

Values of  $a_{\text{SU}}$  for the total plant were calculated from the combined activity and weights of the parts.

Comparisons of  $a_{\text{SU}}$  values derived for various plant part-soil radionuclide combinations at crop maturity are given in Tables 27 and 28. In Table 27  $a_{\text{SU}}$  values for radionuclides are compared for each plant part-soil combination, and in Table 28  $a_{\text{SU}}$  values for plant parts are compared for each radionuclide-soil combination. Table 27 shows that  $a_{\text{SU}}$  values for Sr-85 are the highest in all instances, usually by an order of magnitude. The  $a_{\text{SU}}$  values for Cs-137, Ru-106, Zr-Nb-95, and Ce-144 show no consistent pattern, and are randomly distributed high and low among the plant part-soil combinations. Table 28 shows that  $a_{\text{SU}}$  values for the edible portion of each plant was the lowest in every case, and usually the leafy portion of the plants had the highest  $a_{\text{SU}}$  values.

Table 20

PLANT UPTAKE CONTAMINATION FACTORS ( $a_{SU}$ ) FOR BEANS

<u>Soil</u>	<u>Sr-85</u>	<u>Cs-137</u>	<u>Ru-106</u>	<u>Zr-95-Nb-95</u>	<u>Co-144</u>
<u>Pod</u>					
Sand	8.04	(1)980 <sup>a</sup>	(1)780 <sup>n</sup>	(2)515 <sup>u</sup>	(1)137 <sup>n</sup>
Loam	0.397	(2)622	(2)944	(2)223	(2)383
Clay	1.71	(1)294	---	---	(1)103
<u>Fruit</u>					
Sand	0.245	(1)463	(2)133	(3)137	(3)655
Loam	(1)163	(2)156	(3)862	(4)339	(3)315
Clay	0.106	(1)137	---	---	(4)469
<u>Leaves</u>					
Sand	15.0	0.116	0.662	(1)745	0.246
Loam	3.99	(1)482	0.171	(1)562	(1)933
Clay	5.72	(1)485	---	---	(1)636
<u>Stem</u>					
Sand	9.85	(1)835	0.179	(1)146	(1)263
Loam	1.01	(1)163	(1)210	(2)485	(2)938
Clay	2.01	(1)318	---	---	(1)173
<u>Root</u>					
Sand	5.07	0.132	2.073	0.249	0.274
Loam	0.82	(1)488	0.190	(1)517	(1)932
Clay	0.87	0.172	---	---	0.338
<u>Total Plant</u>					
Sand	4.82	(1)779	0.170	(1)247	(1)440
Loam	1.10	(1)144	(1)439	(1)128	(1)178
Clay	1.14	(1)303	---	---	(1)334

a Number in parentheses is the number of zeros between the decimal point and first digit.

Table 21

PLANT UPTAKE CONTAMINATION FACTORS ( $a_{SU}$ ) FOR CLOVER

<u>Soil</u>	<u>Sr-85</u>	<u>Cs-137</u>	<u>Ru-106</u>	<u>Zr-95-Nb-95</u>	<u>Ce-144</u>
			<u>Tops</u>		
Sand	4.77	(1)928 <sup>a</sup>	0.273	0.117	(1)845 <sup>a</sup>
Loam	1.43	(1)452	(1)337 <sup>a</sup>	(1)441 <sup>a</sup>	(1)497
Clay	1.62	(1)481	—	—	(1)474

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<sup>a</sup> Number in parentheses is the number of zeros between the decimal point and first digit.

Table 22

PLANT UPTAKE CONTAMINATION FACTORS ( $a_{SU}$ ) FOR CARROTS

<u>Soil</u>	<u>Sr-85</u>	<u>Cs-137</u>	<u>Ru-106</u>	<u>Zr-95-Nb-95</u>	<u>Ce-144</u>
<u>Root</u>					
Sand	1.85	(1)830 <sup>b</sup>	(1)468 <sup>b</sup>	(1)289 <sup>b</sup>	(1)236 <sup>b</sup>
Loam	0.522 <sup>a</sup>	(2)394 <sup>a</sup>	(1)107	(2)926	(2)684
Clay	0.409	(1)183	—	—	(1)116
Clay loam	0.423	(2)615	(2)731	(2)763	(1)125
<u>Meat</u>					
Sand	1.50	(1)501	(2)679	(2)368	(2)390
Loam	0.422 <sup>a</sup>	(3)983 <sup>a</sup>	(2)147	(3)705	(2)200
Clay	0.403	(2)792	—	—	(3)870
<u>Peel</u>					
Sand	2.43	0.133	0.163	(1)819	0.116
Loam	0.644 <sup>a</sup>	(2)945 <sup>a</sup>	(1)209	(1)243	(1)224
Clay	0.632	(1)295	—	—	(1)635
<u>Tops</u>					
Sand	5.70	0.152	0.127	0.135	0.202
Loam	1.43 <sup>a</sup>	(1)233 <sup>a</sup>	(1)560	(1)826	(1)658
Clay	1.14	(1)851	—	—	0.182
Clay loam	0.743	(1)167	(1)147	(1)359	(1)439

a Average of five replications

b Number in parentheses is the number of zeros between the decimal point and first digit.

Table 23

PLANT UPTAKE CONTAMINATION FACTORS ( $a_{SU}$ ) FOR LETTUCE

<u>Soil</u>	<u>Sr-85</u>	<u>Cs-137</u>	<u>Ru-108</u>	<u>Zr-95-Nb-95</u>	<u>Ce-144</u>
<u>Head</u>					
Sand	1.41	0.324 <sup>b</sup>	(1)265 <sup>b</sup>	(2)717 <sup>b</sup>	(1)474 <sup>b</sup>
Loam	0.490 <sup>a</sup>	(1)127 <sup>b</sup>	(1)188	(2)231	(1)189
Clay	0.265	(1)831	—	—	(2)827
<u>Leaves</u>					
Sand	4.55	0.668	0.240	(1)578	0.194
Loam	1.47 <sup>a</sup>	(1)225	(1)551	(1)418	(1)982
Clay	1.11	0.121	—	—	0.113
<u>Roots</u>					
Sand	1.97	0.312	0.447	0.153	0.262
Loam	0.710 <sup>a</sup>	(2)906	(1)386	(1)369	(1)551
Clay	0.351	(1)883	—	—	(1)848
<u>Whole</u>					
Sand	3.20	0.484	0.272	(1)641	0.299
Loam	1.04	(1)175	(1)411	(1)313	(1)685
Clay	0.614	0.134	—	—	0.116

a Average of five replications

b Numbers in parentheses is the number of zeros between the decimal point and first digit.

Table 24

PLANT UPTAKE CONTAMINATION FACTORS ( $a_{SU}$ ) FOR RADISHES

<u>Soil</u>	<u>Sr-85</u>	<u>Cs-137</u>	<u>Ru-106</u>	<u>Zr-95-Nb-95</u>	<u>Ce-144</u>
<u>Root</u>					
Sand	3.80	(1)312 <sup>b</sup>	—	(1)174 <sup>b</sup>	—
Loam	1.35 <sup>a</sup>	(2)446	—	(2)659	(2)233 <sup>b</sup>
Clay	0.814	—	—	—	—
<u>Tops</u>					
Sand	12.6	0.120	—	(1)849	—
Loam	7.49 <sup>a</sup>	(1)569	—	(1)482	0.136
Clay	5.70	—	—	—	—

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a Average of five replications

b Number in parentheses is the number of zeros between the decimal point and first digit.

Table 25

PLANT UPTAKE CONTAMINATION FACTORS ( $a_{SU}$ ) FOR TOMATOES

<u>Soil</u>	<u>Sr-85</u>	<u>Cs-137</u>	<u>Ru-106</u>	<u>Zr-95-Nb-95</u>	<u>Ce-144</u>
<u>Fruit</u>					
Sand	0.306 <sup>a</sup>	(1)840 <sup>a</sup>	(2)592 <sup>a</sup>	(3)376 <sup>a</sup>	(2)386 <sup>a</sup>
Loam	(1)379 <sup>a</sup>	(3)459	(3)735	(3)542	(2)145
Clay	0.166	(1)167	—	—	(2)135
<u>Peel</u>					
Sand	0.421	(1)810	(2)892	(3)686	(2)563
Loam	(1)438	(3)561	—	(3)518	(2)447
Clay	0.257	(1)173	—	—	(2)130
<u>Meat</u>					
Sand	0.271	(1)855	(2)444	(3)224	(2)306
Loam	(1)337	(3)413	—	(3)592	(3)183
Clay	0.128	(1)164	—	—	(2)138
<u>Leaves</u>					
Sand	4.68	0.225	0.232	(1)749	0.253
Loam	1.80	(1)205	(1)843	0.121	0.412
Clay	1.91	(1)723	—	—	0.243
<u>Stem</u>					
Sand	6.29	0.117	(1)282	(1)113	(1)619
Loam	1.28	(1)427	(1)328	(1)147	0.171
Clay	1.16	(1)298	—	—	(1)462
<u>Roots</u>					
Sand	4.58	0.151	0.562	0.169	0.329
Loam	1.44	(1)245	0.155	0.108	(1)906
Clay	1.11	0.156	—	—	0.293
<u>Total Plant</u>					
Sand	2.67	0.127	(1)993	(1)312	(1)870
Loam	0.905	(1)141	(1)633	(1)427	0.190
Clay	0.871	(1)505	—	—	0.154

<sup>a</sup> Number in parentheses is the number of zeros between the decimal point and first digit.



Table 26

PLANT UPTAKE CONTAMINATION FACTORS ( $a_{SU}$ ) FOR WHEAT

<u>Soil</u>	<u>Sr-85</u>	<u>Cs-137</u>	<u>Ru-106</u>	<u>Zr-95-Nb-95</u>	<u>Co-144</u>
<u>Heads</u>					
Sand	0.512	(1)640 <sup>a</sup>	(2)382 <sup>a</sup>	(3)368 <sup>a</sup>	(2)115 <sup>a</sup>
Loam	0.117	(3)771 <sup>b</sup>	(2)194	(3)464	(3)461
Clay	(1)673 <sup>a</sup>	(1)150	—	—	(2)264
Clay Loam	(1)214	(2)189	—	—	(3)994
<u>Grain</u>					
Sand	0.309	(1)617	—	—	—
Loam	0.110	(3)677	—	—	—
Clay	(1)653	(1)129	—	—	(3)138
Clay Loam	(1)102	(2)121	—	—	(3)429
<u>Leaves</u>					
Sand	4.27	0.150 <sup>b</sup>	0.179	(1)588	(1)635
Loam	1.10	(1)164 <sup>b</sup>	(1)746	(1)229	(1)205
Clay	0.696	(1)373	—	—	(1)302
Clay Loam	0.306	(1)198	(1)278	(1)177	(1)137
<u>Stalks</u>					
Sand	2.11	(1)850 <sup>b</sup>	(1)479	(2)319	(2)459
Loam	0.526	(2)372 <sup>b</sup>	(1)141	(2)369	(2)291
Clay	0.576	(1)227	—	—	(2)774
<u>Roots</u>					
Sand	11.1	0.206 <sup>b</sup>	0.946	0.251	0.519
Loam	0.519	(1)877 <sup>b</sup>	0.217	0.120	0.166
Clay	0.162	(1)373	—	—	0.348
<u>Total Plant</u>					
Sand	1.82	(1)965	0.118	(1)495	(1)570
Loam	0.400	(2)650	(1)183	(2)867	(1)109
Clay	0.288	(1)228	—	—	(1)211

a Number in parentheses is the number of zeros between the decimal point and first digit.

b Average of three replications

Table 27

COMPARISONS OF  $a_{SU}$  VALUES BY RADIONUCLIDE

Soil	Beans	Carrots	Lettuce	Radish	Tomatoes	Wheat	Clover
	<u>Fruit</u>	<u>Root</u>	<u>Head</u>	<u>Roots</u>	<u>Fruit</u>	<u>Heads</u>	<u>Tops</u>
Sand	Sr > Cs >> Ru > Ce > Zr	Sr >> Cs > Ru > Zr = Ce	Sr > Cs >> Ce > Ru > Zr	Sr > Cs > Zr	Sr > Cs >> Ru > Ce > Zr	Sr >> Cs > Ce > Zr - Ru	Sr >> Cs > Ce > Zr - Ru
Loam	Sr >> Cs >> Ru > Ce > Zr	Sr >> Ru = Zr = Ce > Cs	Sr >> Ce = Ru > Zr > Cs	Sr >> Zr = Cs	Sr >> Ru > Cs > Zr	Sr > Ce > Zr > Cs	Sr > Cs
Clay	Sr >> Cs >> Ce	Sr >> Cs = Ce	Sr > Cs >> Ce		Sr >> Cs > Ce		
	<u>Pods</u>	<u>Peel</u>	<u>Leaves</u>	<u>Tops</u>	<u>Peel</u>		
Sand	Sr >> Cs = Ru > Ce > Zr	Sr >> Ru = Cs = Ce > Zr	Sr > Cs > Ru > Ce > Zr	Sr > Cs > Zr	Sr > Cs >> Ru = Ce > Zr		
Loam	Sr >> Ru = Cs > Ce > Zr	Zr >> Zr = Ce = Ru > Cs	Sr >> Ce > Ru > Zr > Cs	Sr > Ce > Cs > Zr	Sr >> Ce >> Cs > Zr		
Clay	Sr >> Cs > Ce	Sr >> Cs > Cs	Sr >> Cs = Ce		Sr >> Cs >> Ce		
	<u>Leaves</u>	<u>Meat</u>	<u>Roots</u>		<u>Meat</u>	<u>Stalks</u>	
Sand	Sr >> Ru > Ce > Cs > Zr	Sr >> Cs > Ru > Ce > Zr	Sr > Ru > Cs > Ce > Zr		Sr > Cs >> Ru = Ce > Zr		
Loam	Sr >> Ru > Ce > Zr > Cs	Sr >> Ce = Ru >> Cs > Zr	Sr >> Ce > Ru > Zr > Cs		Sr >> Zr = Cs > Ce		
Clay	Sr >> Ce = Cs	Sr >> Cs > Ce	Sr > Cs > Ce		Sr >> Cs >> Ce		
	<u>Stem</u>	<u>Tops</u>			<u>Leaves</u>	<u>Leaves</u>	
Sand	Sr >> Ru > Cs > Ce > Zr	Sr >> Ce = Cs = Zr = Ru			Sr >> Ru = Cs > Ce > Zr		
Loam	Sr >> Ru = Cs > Ce > Zr	Sr >> Zr = Ce = Ru > Cs			Sr > Ce > Zr = Ru > Cs		
Clay	Sr >> Cs > Ce	Sr >> Ce > Cs			Sr >> Cs > Cs		
	<u>Roots</u>				<u>Stem</u>	<u>Roots</u>	
Sand	Sr > Ru >> Ce = Zr > Cs				Sr >> Cs > Ce > Ru > Zr		
Loam	Sr > Ru > Ce = Zr > Cs				Sr >> Ce > Cs = Ru > Zr		
Clay	Sr > Ce > Cs				Sr >> Ce > Cs		
					<u>Roots</u>		
Sand					Sr >> Ru = Ce > Zr > Cs		
Loam					Sr >> Ru > Zr = Ce > Cs		
Clay					Sr >> Ce > Cs		

&gt;&gt; Indicates much greater than (a factor of 10 or more).

&gt; Indicates greater than (a factor more than 2 and less than 10).

= Indicates approximately equal to (within a factor of 2).

Table 28  
COMPARISON OF  $a_{SU}$  VALUES BY PLANT PART

Radionuclide	Soil	Beans	Tomatoes	Wheat	Carrots	Lettuce
Sr-85	Sand	Leaves > Stem = Pod = Root >>> Fruit	Stem = Leaves = Root >>> Fruit	Root > Leaves > Stalks > Heads > Grain	Tops > Roots	Leaves > Roots = Head
	Loam	Leaves > Stem = Root > Pod >>> Fruit	Leaves = Root = Stem >>> Fruit	Leaves > Root = Stalks > Heads > Grain	Tops > Roots	Leaves > Roots = Head
	Clay	Leaves > Stem = Pod > Root >>> Fruit	Leaves = Stem = Root >>> Fruit	Leaves = Stalk > Root > Heads > Grain	Tops > Roots	Leaves > Roots = Head
Cs-137	Sand	Root = Leaves = Pod = Stem > Fruit	Leaves = Root = Stem > Fruit	Root = Leaves > Stalks > Heads > Grain	Tops > Roots	Leaves > Roots = Head
	Loam	Root = Leaves > Stem > Pod > Fruit	Stem > Leaves = Root >>> Fruit	Root > Leaves > Stalks >>> Heads > Grain	Tops > Roots	Leaves > Head = Roots
	Clay	Root > Leaves = Stem = Pod > Fruit	Root > Leaves > Stem >>> Fruit	Root > Leaves > Stalks = Heads > Roots	Tops > Roots	Leaves = Roots = Head
Ru-106	Sand	Root > Leaves > Stem > Pod >>> Fruit	Root > Leaves > Stem >>> Fruit	Root > Leaves > Stalks >>> Heads > Grain	Tops > Roots	Roots > Leaves >> Head
	Loam	Root = Leaves > Stem > Pod >>> Fruit	Root > Leaves > Stem >>> Fruit	Root > Leaves > Stalks > Heads > Grain	Tops > Roots	Leaves = Roots > Head
	Sand	Root > Leaves > Stem >>> Pod >>> Fruit	Root > Leaves > Stem >>> Fruit	Root > Leaves >>> Stalk >>> Heads > Grain	Tops > Roots	Roots > Heads = Leaves
Zr-Nb-95	Loam	Leaves = Roots >>> Stem > Pod >>> Fruit	Leaves = Root > Stem >>> Fruit	Root > Leaves >>> Stalk >>> Heads > Grain	Tops > Roots	Leaves = Roots >>> Head
	Sand	Root = Leaves >>> Stem > Pod >>> Fruit	Root = Leaves > Stem >>> Fruit	Root > Leaves >>> Stalks > Heads > Grain	Tops >>> Roots	Root = Leaves > Head
	Loam	Leaves = Root >>> Stem > Pod >>> Fruit	Leaves > Stem > Root >>> Fruit	Root > Leaves > Stalks > Heads > Grain	Tops >>> Roots	Leaves = Roots > Head
Ce-144	Sand	Root > Leaves > Stem = Pod >>> Fruit	Root = Leaves > Stem >>> Fruit	Root > Leaves > Stalks > Heads > Grain	Tops >>> Roots	Leaves = Root >>> Head
	Loam	Leaves = Root >>> Stem > Pod >>> Fruit	Leaves > Stem > Root >>> Fruit	Root > Leaves > Stalks > Heads > Grain	Tops >>> Roots	Leaves = Root >>> Head
	Clay	Root > Leaves > Stem = Pod >>> Fruit	Root = Leaves > Stem >>> Fruit	Root > Leaves > Stalks > Heads > Grain	Tops >>> Roots	Leaves = Root >>> Head

>> Indicates much greater than (a factor of 10 or more).

> Indicates greater than (a factor more than 2 and less than 10).

= Indicates approximately equal to (within a factor of 2).

## Dependence of $a_{SU}$ on Exchangeable Soil Cations

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Ions of fission product radionuclides introduced into a soil compete with and can replace other ions on exchange sites in the soil. Thus the types of interactions that occur between soluble radionuclides and chemical constituents of the soil determine the availability of the radionuclides for assimilation by plants.

Several investigators have demonstrated<sup>18,19,20</sup> that the uptake of the radioelements of strontium can be related to the exchangeable calcium content in the soil. Available data<sup>7</sup> on the relationships between the concentration of strontium and calcium in soils indicate that ionic adsorption is one step in the process of transferring ions from solution in contact with soil to solution in the plant. The relative uptake between the two ions is usually expressed as an Observed Ratio<sup>21</sup> which is defined as the ratio of strontium to calcium in the plant tissues divided by the ratio of strontium to calcium in the external source of nutrients from which the ions are derived. Investigation<sup>22</sup> has shown that the Observed Ratio is not influenced by large variations in the ratio in which the ions are supplied to plants. The fact that the amount absorbed into the plant is only a very small fraction of the amount in solution suggests that the adsorption onto the surface of roots and absorption through the root surface are the controlling steps in the uptake process. Data presented in Reference 7 showed that the root does not distinguish (or discriminate) strontium from calcium. These divalent cations appear to be absorbed in proportion to their available concentration in the soil.

The condition that the ratio of the concentrations of the two cations is the same in the plant as it is in the soil may be written as

$$\frac{n_p^o(\text{Sr})}{n_p^o(\text{Ca})} = \frac{n_s(\text{Sr})}{n_s(\text{Ca})} \quad (2)$$

in which

- $n_s(\text{Sr})$  is the concentration (atoms/gram) of available strontium in the soil
- $n_s(\text{Ca})$  is the concentration (atoms/gram) of available calcium in the soil
- $n_p^o(\text{Sr})$  is the concentration (atoms/gram) of strontium in the plant
- $n_p^o(\text{Ca})$  is the concentration (atoms/gram) of calcium in the plant.

For most cases of interest in fallout contamination,  $n_s(\text{Sr})$  and  $n_p^0(\text{Sr})$  are negligible to the  $n_s(\text{Ca})$  and  $n_p^0(\text{Ca})$  so that Equation 2 becomes

$$\frac{n_p^0(\text{Sr})}{n_p^0} = \frac{n_s(\text{Sr})}{n_s} \quad (3)$$

where

$$n_s = n_s(\text{Sr}) + n_s(\text{Ca}) \text{ atoms/gram} \quad (4)$$

and

$$n_p^0 = n_p^0(\text{Sr}) + n_p^0(\text{Ca}) \text{ atoms/gram} \quad (5)$$

Several investigators<sup>23,24</sup> have reported that the equilibrium value for solute uptake follows the Freundlich adsorption equation. This equation for the uptake of strontium and calcium is represented by

$$n_p^0 = a_0 [n_s]^{1-m} \text{ atoms/gram} \quad (6)$$

where  $a_0$  and  $m$  are empirical constants for a given type of plant.

Solving Equation 3 for  $n_p^0$  and equating to Equation 6 gives

$$n_p^0(\text{Sr}) = n_s(\text{Sr}) a_0 n_s^{-m} \quad (7)$$

and as indicated that  $n_s \approx n_s(\text{Ca})$

$$n_p^0(\text{Sr}) = n_s(\text{Sr}) a_0 [n_s(\text{Ca})]^{-m} \quad (8)$$

The soil uptake contamination factor,  $a_{\text{SU}}$ , for a given plant and element is defined as

$$a_{\text{SU}}(j) = \frac{n_p(j)}{n_s^0(j)} \quad (9)$$

in which  $n_p(j)$  is the concentration of element  $j$  in the plant (atoms/gram of dry plant part) and  $n_s^0(j)$  is the initial concentration of element  $j$  in the soil prior to planting time (atoms/gram of soil). For a soil density of  $\rho$  and depth of mixing of  $D$  for the  $N_1^0$  atoms deposited on the soil, and a plant surface density of  $w_p$  (at harvest time),  $n_s^0(j)$  is distributed according to

$$n_s^0(j) = \frac{N_1^0}{\rho D} = \frac{n_p(j)w_p}{\rho D} + n_s(j) \quad (10)$$

Since the fraction of an element such as strontium that is assimilated by a plant is very small,  $n_s^0(j)$  is essentially equal to  $n_s(j)$ . However, it is conceivable that when  $n_s^0(j)$  is also very small, the value of  $n_s(j)$  could be a small fraction of  $n_s^0(j)$ .

An equilibrium deposition of strontium and calcium (or other element) within the plant tissues, as in compound formation or crystal formation, may be described by

$$n_p(j) = K_j n_p^0(j) \quad (11)$$

where  $K_j$  is the equilibrium constant for the formation process. Substitution of Equations 10 and 11 into Equation 9 gives

$$a_{SU}(j) = \frac{K_j n_p^0(j)}{\frac{w_p K_j}{\rho D} n_p^0(j) + n_s(j)} \quad (12)$$

For the case where the element  $j$  is strontium (or calcium) substitution of Equation 8 in Equation 12 results in

$$a_{SU}(j) = \frac{K_j a_o [n_s(\text{Ca})]^{-m}}{\left[ \frac{w_p K_j a_o}{\rho D} [n_s(\text{Ca})]^{-m} + 1 \right]} \quad (13)$$

In the usual case where the fraction assimilated by the plant is small, then  $a_{SU}$  for the plant, or a plant part, is given by

$$a_{SU}(j) = K_j a_o [n_s(Ca)]^{-m} \quad (14)$$

There is some justification for relating the uptake of other radionuclides to the exchangeable calcium contents of soils, since calcium is the predominant base in nearly all agricultural soils. Changes in calcium content of soils are correlated with changes in pH, total base exchange capacities, and other exchangeable cations of the soil, which may in themselves have an effect on the uptake of radionuclides by plants (since all soluble ions would contribute to the ionic strength of the aqueous media in contact with the plant roots).

Equation 14 relating uptake factor to exchangeable calcium was rewritten in the form

$$a_{SU} = a_{SU}^o [Ca^{++}]^{-m} \quad (15)$$

where  $a_{SU}^o$  and  $m$  are empirical constants and  $[Ca^{++}]$  is the exchangeable calcium concentration in milligrams of calcium per gram of soil.

Constants  $a_{SU}^o$  and  $m$  were calculated from Equation 15 using a regression analysis of the  $a_{SU}$  values for mature crop samples. Table 29 summarizes the constants for each plant part-soil-radionuclide combination analyzed.

A least square line for several of the plant part-soil-radionuclide combinations is shown graphically in Figures 5 through 9. In each figure are the respective  $a_{SU}$  values derived in each soil type.

For some plant part-radionuclide combinations, the  $a_{SU}$  values obtained in clay were higher than those obtained in loam. This was inconsistent with the predictions of Equation 15. An explanation of the high  $a_{SU}$  values in the clay soil was sought in the textural consistency of the different soils. It was noted during the blending of synthetic fallout with the top 8-inch layer of soil that the clay was reduced to finely divided particles. These fine particles may have formed an impervious layer of soil in the box that is atypical of the clay in its natural state. Sides were removed from soil boxes containing each of the three types of soil and the root system was examined. The root systems of the crops grown in the clay soil remained predominantly in the top 8-inch layer of soil, whereas in the sand and loam soils the root system grew to much greater depths, depending on crop type. Thus the high  $a_{SU}$  values may have resulted from the root

Table 29

DERIVED CONSTANTS FOR THE EQUATION  $a_{SU} = a_{SU}^0 \left[ \frac{Ca^{++}}{Ca^{++}} \right]^{-n}$

Crop	Part	Sr-85			Cs-137			Ru-106			Zr-95-Nb-95			Ce-144		
		$a_{SU}^0$	n		$a_{SU}^0$	n		$a_{SU}^0$	n		$a_{SU}^0$	n		$a_{SU}^0$	n	
Bean	Leaf	8.47	1.22		(1)800 <sup>a</sup>	0.806		0.375 <sup>a</sup>	1.24		(1)660 <sup>a</sup>	0.301		0.169	0.768	
	Stem	4.10	1.64		(1)422	1.53		(1)710 <sup>a</sup>	1.98		(2)940	0.973		(1)162 <sup>a</sup>	1.01	
	Pod	2.36	1.36		(1)310	1.66		(1)330	1.91		(2)365	0.756		(2)780	0.984	
	Fruit	(2)990 <sup>a</sup>	1.12		(1)130	1.71		(2)112	0.447		(4)780	1.24		(3)439	1.49	
Carrot	Top	3.27	1.26		(1)753	1.43		(1)826	1.25		0.105	0.759		0.129	1.01	
	Root	1.16	0.875		(1)290	1.81		(1)268	1.17		(1)187	1.73		(1)157	0.468	
Clover	Top	2.85	1.23		(1)795	0.394		0.118	1.92		(1)775	0.848		(1)695	0.339	
Lettuce	Leaf	2.97	0.811		0.194	2.04		0.130	1.33		(1)495	0.288		0.153	0.343	
	Head	0.837	0.749		0.102	1.86		(1)225	0.323		(2)450	1.03		(1)321	0.963	
Tomato	Leaf	3.15	1.13		(1)780	1.59		0.150	0.933		(1)495	0.933		0.180	0.849	
	Stem	3.35	1.43		(1)794	0.781		(1)178	0.933		(1)772	0.933		(1)405	0.954	
	Fruit	0.134	0.904		(1)145	2.13		(2)255	1.83		(3)166	1.83		(2)260	1.44	
Wheat	Leaf	2.52	0.819		(1)546	1.58		0.123	1.08		(1)409	0.780		(1)448	1.16	
	Stalk	1.26	0.809		(1)254	2.44		(1)290	1.08		(2)200	0.895		(2)390	0.639	
	Head	0.246	1.13		(2)900	3.32		(2)285	0.510		(3)295	0.631		(3)775	0.825	
	Grain	0.201	1.11		(1)120	3.28		—	—		—	—		—	—	
Radish	Top	9.95	0.456		(1)875	0.663		—	—		(1)670	0.504		—	—	
	Root	2.53	0.869		(1)143	1.78		—	—		(1)118	0.896		—	—	

a Number in parentheses is the number of zeros between the decimal point and the first digit.



Figure 5

# VARIATION OF $\sigma_{su}$ WITH EXCHANGEABLE CALCIUM

## CARROTS - TOPS AND ROOTS

○ TOPS  
 □ ROOTS

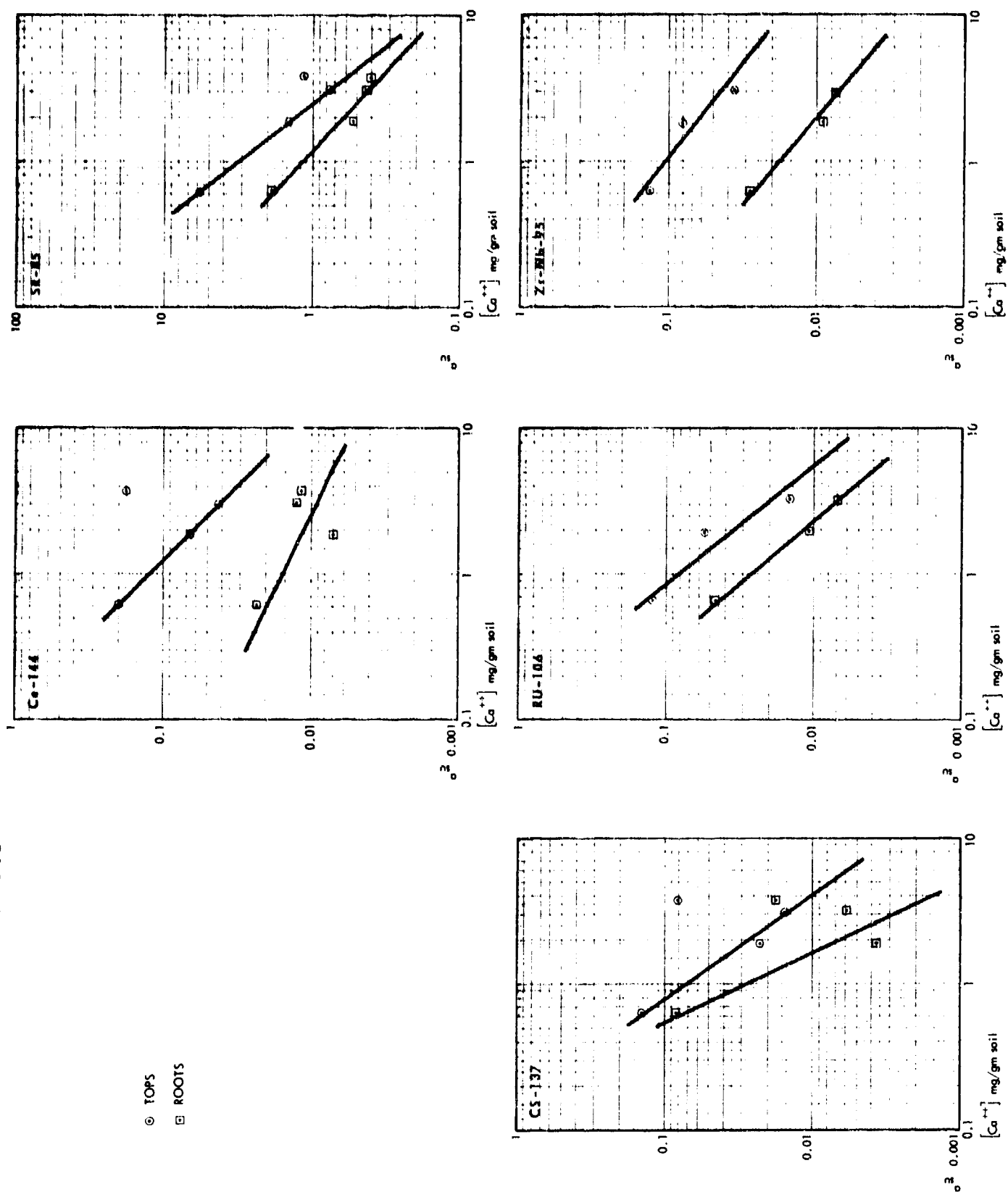


Figure 6

VARIATION OF  $\alpha_{su}$  WITH EXCHANGEABLE CALCIUM  
WHEAT - LEAVES AND STOCKS

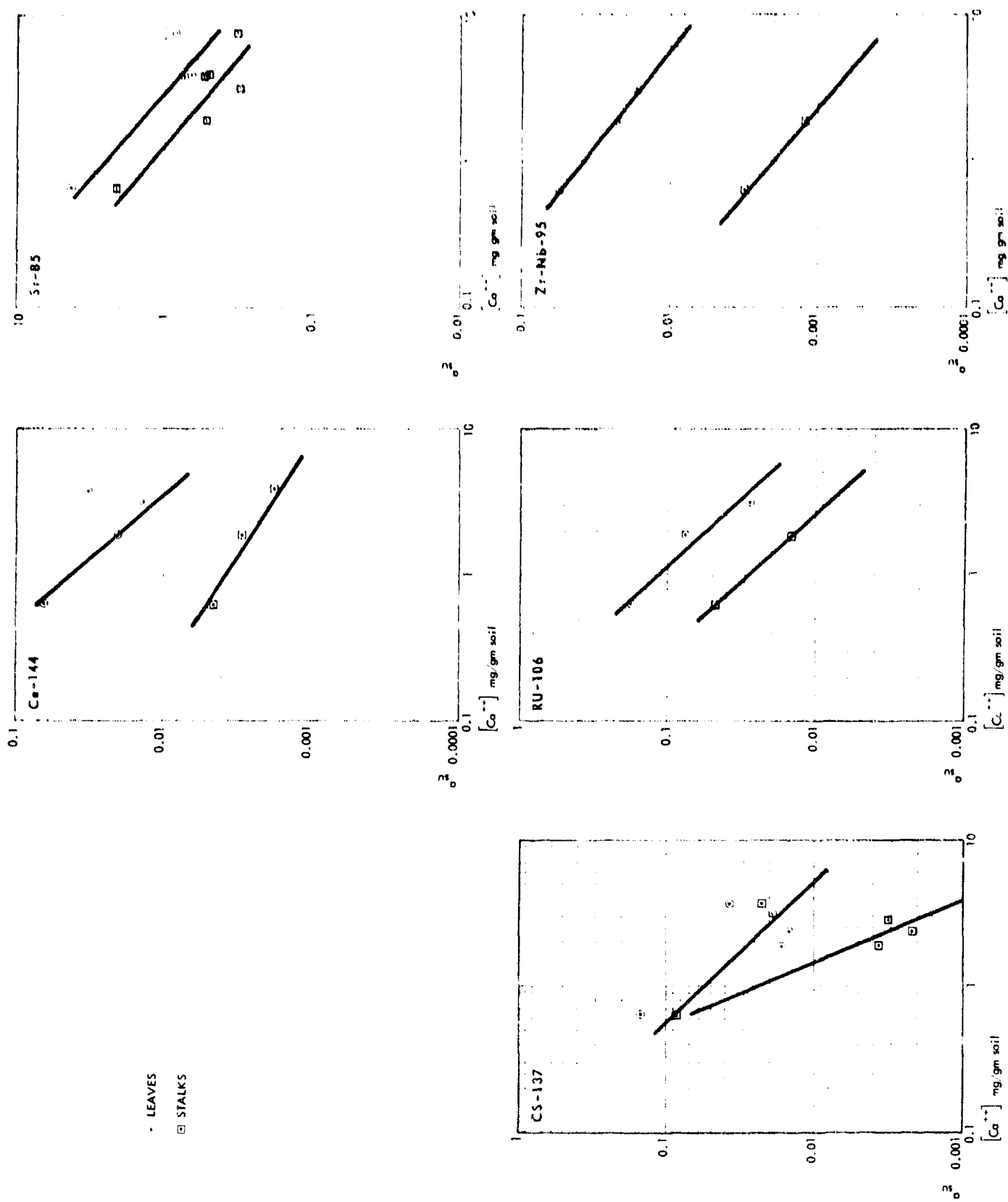


Figure 7  
 VARIATION OF  $\alpha_{50}$  WITH EXCHANGEABLE CALCIUM  
 CLOVER - TOPS

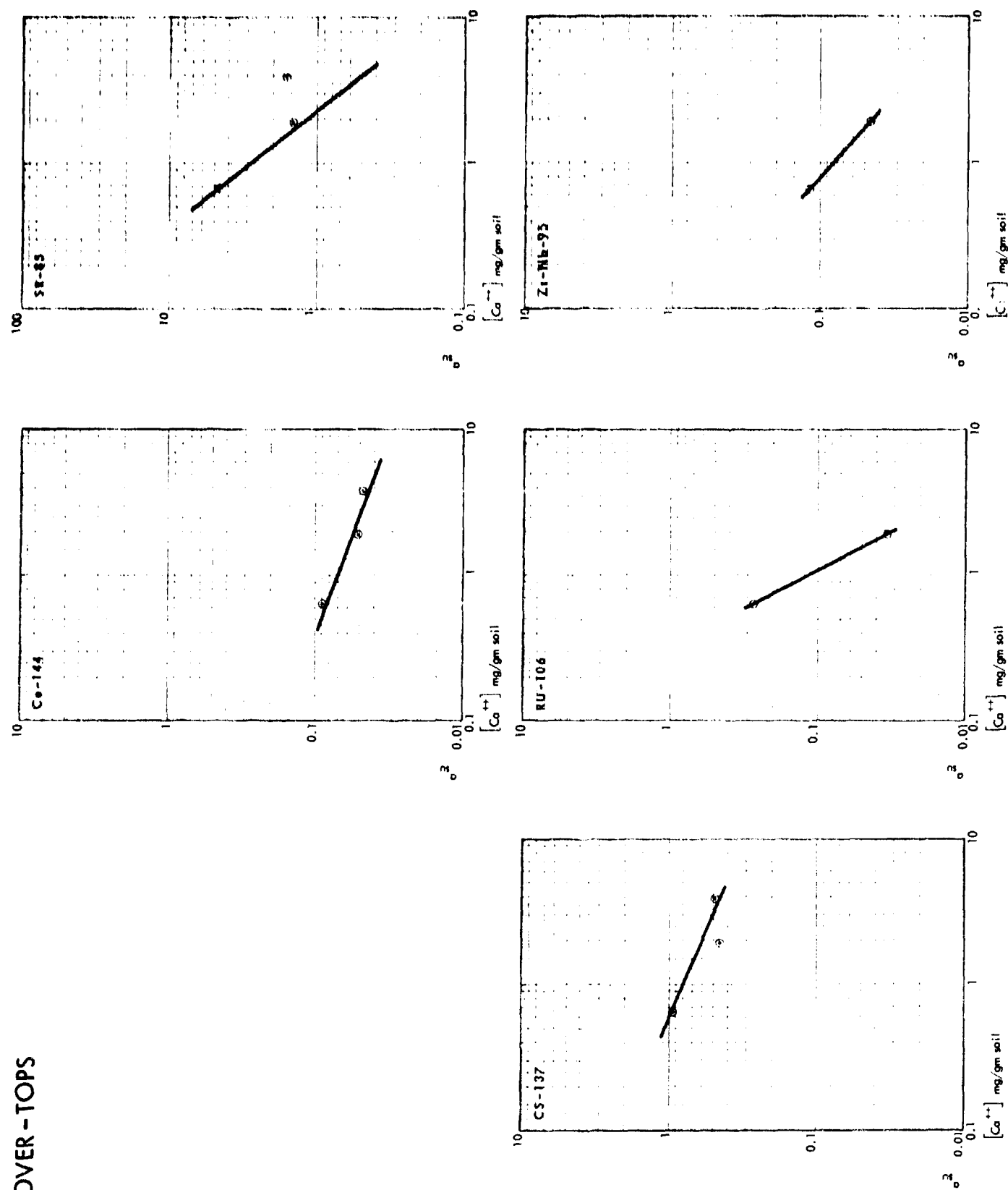


Figure 8a

VARIATION OF  $\alpha_{SU}$  WITH EXCHANGEABLE CALCIUM

BEANS - PODS AND FRUIT

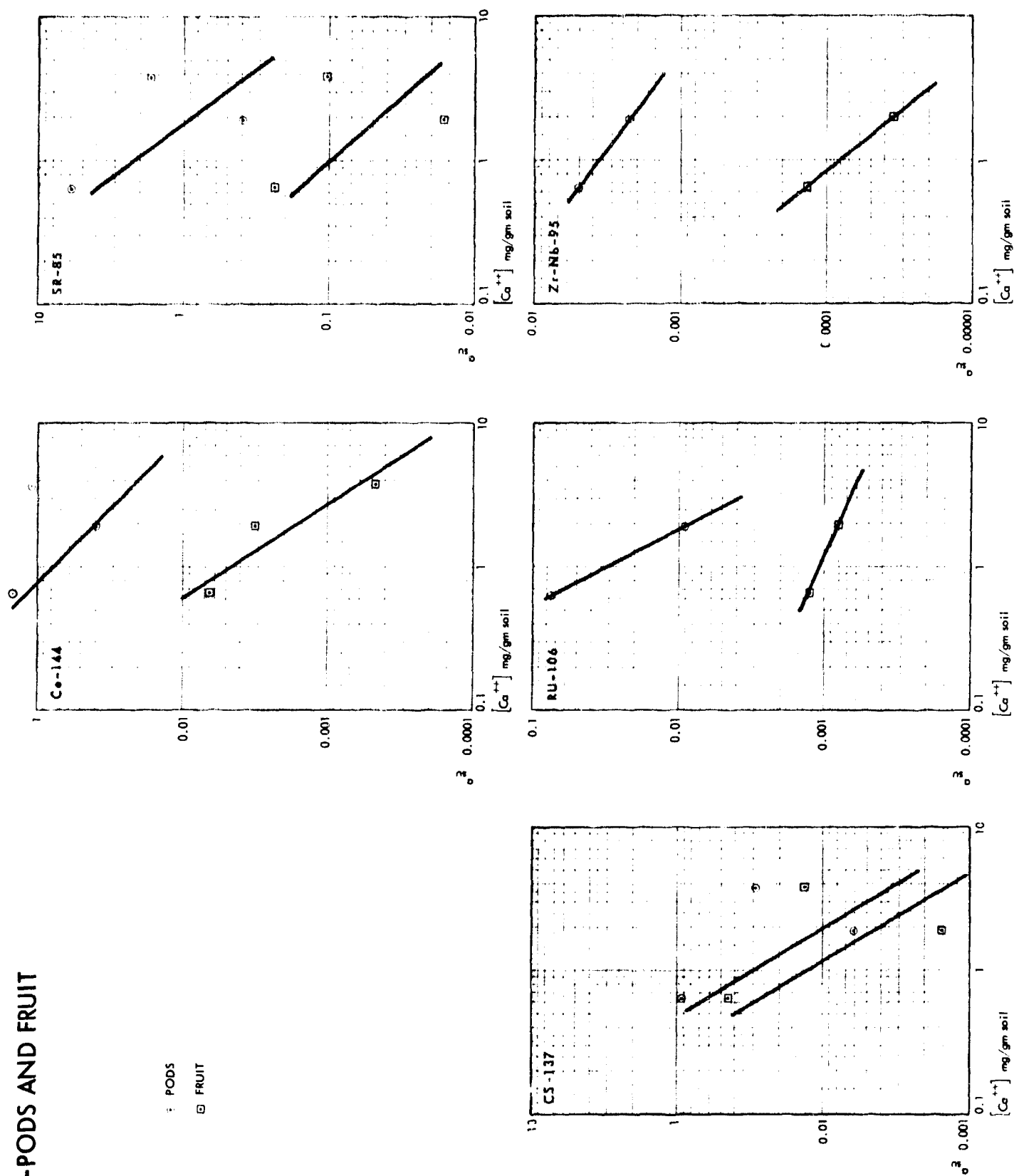
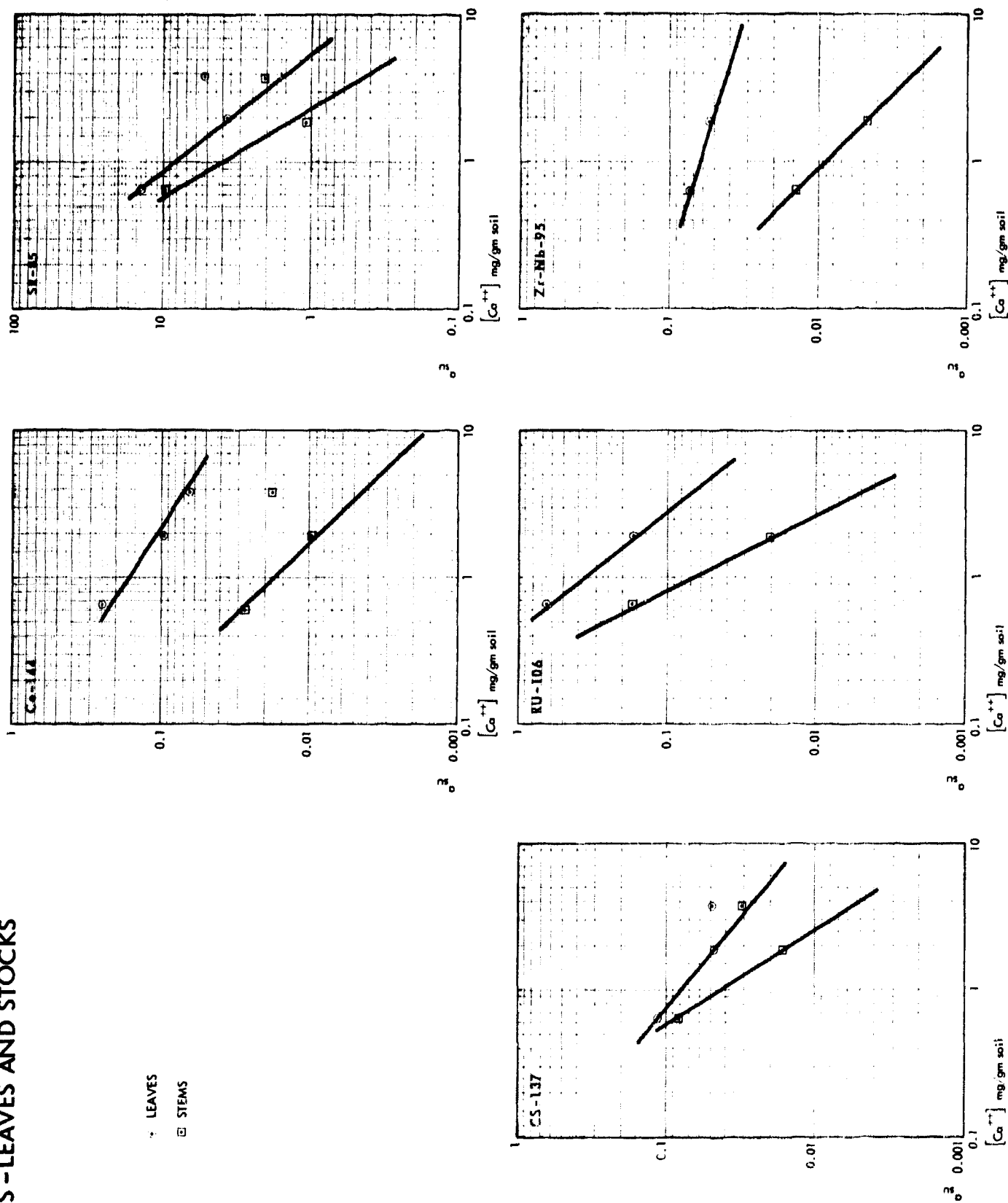


Figure 8

VARIATION OF  $a_{50}$  WITH EXCHANGEABLE CALCIUM  
BEANS - LEAVES AND STOCKS



**Figure 9**  
**VARIATION OF  $a_{\text{Cu}}$  WITH EXCHANGEABLE CALCIUM**  
**LETTUCE - LEAVES AND HEADS**

○ LEAVES  
 □ HEADS

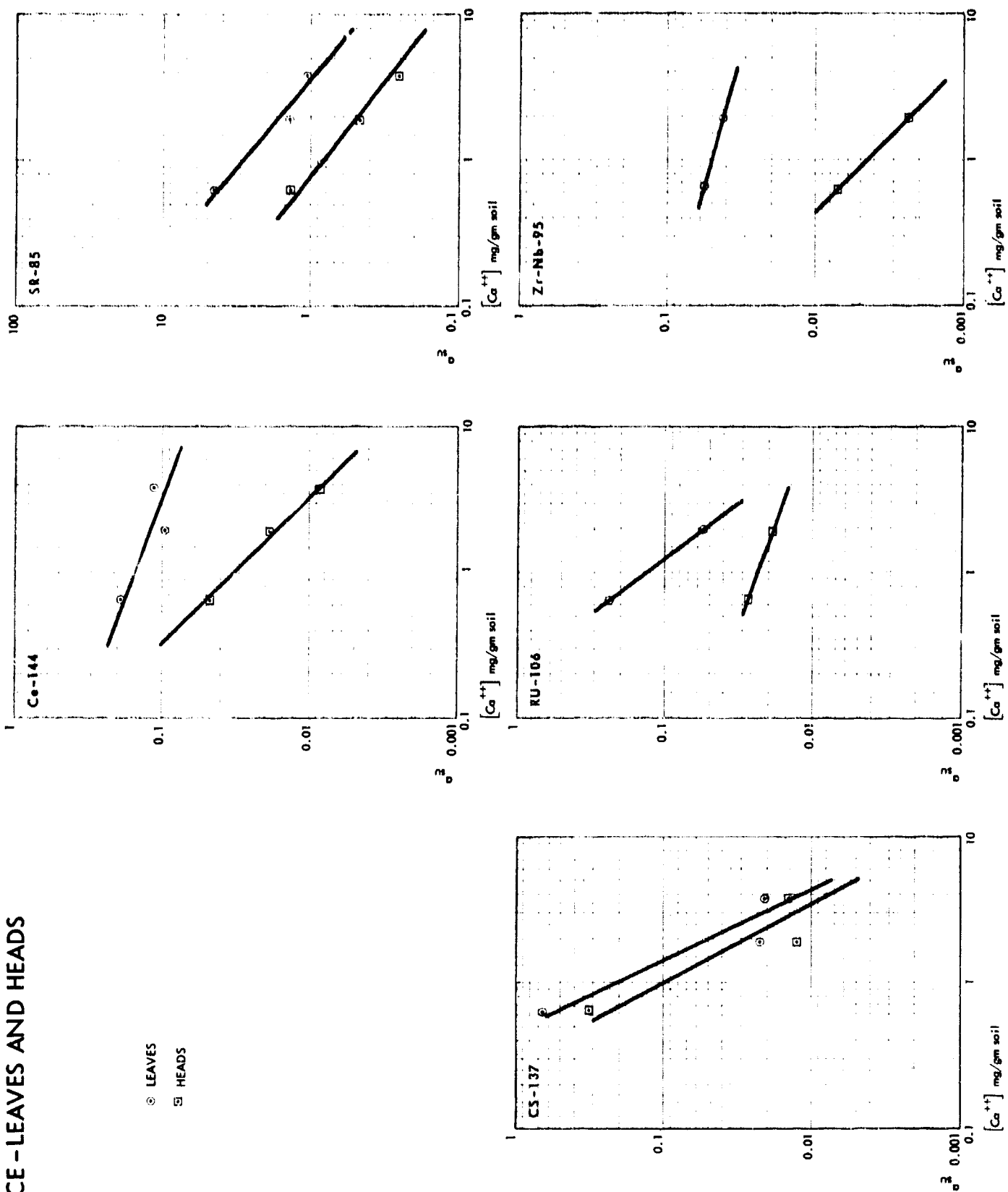


Table B-1 (continued)

<u>Month</u>	<u>Day</u>	<u>Temperature °F</u>			<u>Relative Humidity (percent)</u>			<u>Time (inches)</u>
		<u>Max</u>	<u>Min</u>	<u>Time</u>	<u>Max</u>	<u>Min</u>	<u>Time</u>	
September (cont.)	16	84		1300	84		0600	
			56	0600		12	2200	
	17	75		1500	32		2300	
			60	0700		10	1800	
	18	78		1400	50		0800	
			43	0700		12	1500	
	19	84		1400	72		0600	
			44	0600		12	1500	
	20	86		1400	60		0800	
			44	0600		14	1400	
	21	91		1500	66		0800	
			47	0700		15	1500	
	22	89		1400	72		0800	
			50	0700		20	1400	
	23	86		1400	84		0600	
			52	0300		26	1500	
	24	78		1400	80		0400	
			56	0300		32	1400	
	25	74		1400	72		2300	
			58	2200		36	1500	
	26	73		1500	66		2000	
			60	2200		40	1600	
	27	68		1500	78		0800	
			58	0800		40	1700	
	28	78		1500	78		0200	
			50	0200		25	1600	
	29	84		1400	82		0800	
			44	0600		10	1400	
	30	86		1500	58		0800	
			46	0700		16	1600	
October	1	93		1400	60		0800	
			48	0700		12	1600	
	2	82		1400	56		0800	
			49	0700		22	1600	
	3	84		1400	80		0600	
			48	0600		18	1500	
	4	76		1400	86		0700	
			50	0400		30	1400	
	5	83		1400	72		0400	
			50	0400		30	1500	
	6	89		1500	82		0800	
			49	0700		16	1500	
	7	94		1500	64		0800	
			53	0700		18	1600	

Table B-1 (continued)

Month	Day	Temperature °F			Relative Humidity (percent)			Rain (inches)
		Max	Min	Time	Max	Min	Time	
October (cont.)	8	76		1400	80		0600	0.02
			54	0400		34	1500	
	9	71		1400	72		1100	
			56	2300		38	1500	
	10	80		1300	78		1000	
			51	0600		30	1600	
	11	88		1300	80		0600	
			49	0700		26	1400	
	12	90		1300	82		0700	
			50	0600		25	1400	
	13	81		1300	82			
			50	0600		34	1300	
	14	70		1300	80		0400	
			56	0600		48	0200	
	15	70		1300	80		2400	
			46	0600		24	1400	
	16	71		1500	76		0400	
			43	0800		14	1600	
	17	80		1300	68		0800	
			43	0600		20	1400	
	18	74		1400	82		0600	
			47	0400		44	1400	
	19	82		1400	82		0100	
			54	2300		30	1500	
	20	83		1300	80		0600	
			47	0700		20	1500	
	21	90		1400	70		0800	
			47	0700		18	1500	
	22	90		1400	66		0800	
			48	0700		16	1400	
	23	92		1400	64		0800	
			49	0700		14	1500	
	24	92		1400	58		0800	
			50	0700		14	1500	
	25	92		1400	52		0800	
			50	0600		18	1500	
	26	91		1400	62		0800	
			49	0700		20	1500	
	27	84		1400	74		0800	
			48	0700		20	1400	
	28	86		1500	80		0600	
			51	0700		26	1500	
	29	85		1300	70		0800	
			47	0700		20	1300	



Table B-1 (continued)

Month	Day	Temperature °F			Relative Humidity (percent)			Rain (inches)
		Max	Min	Time	Max	Min	Time	
October (cont.)	30	86		1400	70		0800	0.55
			46	0700		24	1500	
	31	80		1300	72		0800	
46			0700	30		1400		
November	1	70		1300	86		0100	
			50	0100		38	1400	
	2	72		1300	80		0200	
			46	0100		34	1400	
	3	76		1300	78		0600	
			47	0400		26	1400	
	4	78		1400	82		0800	
			50	0600		32	1400	
	5	79		1300	88		0900	
			50	0600		24	1400	
	6	78		1300	80		0800	
			44	0600		18	1500	
	7	71		1400	79		0800	
			45	0600		38	1400	
	8	72		1300	88		0400	
			58	0400		32	1500	
	9	68		1300	82		0600	
			43	0600		36	1300	
	10	72		1300	82		0600	
			43	0600		36	1300	
11	73		1300	82		0800		
		47	0700		32	1400		
12	57		1300	98		1400		
		52	0100		70	0600		
13	59		1400	98		1200		
		54	0200		52	1800		
14	65		1100	98		1600		
		54	0200		44	1200		
15	72		1300	98		0400		
		54	0200		40	1400		
16	58		1400	86		0200		
		52	0700		70	1800		
17	70		1200	84		0200		
		51	0700		50	1200		
18	64		1400	82		2300		
		54	0800		48	1200		
19	64		1400	84		1100		
		50	0700		44	1400		
20	64		1400	86		0600		
		44	0600		48	1400		

Table B-1 (concluded)

<u>Month</u>	<u>Day</u>	<u>Temperature °F</u>			<u>Relative Humidity (percent)</u>			<u>Rain (inches)</u>
		<u>Max</u>	<u>Min</u>	<u>Time</u>	<u>Max</u>	<u>Min</u>	<u>Time</u>	
November (cont.)	21	67		1300	86		0900	1.42
			39	0600		34	1500	
	22	56		1300	90		2300	
			38	0400		88	0800	
	23	61		1300	98		0200	
			48	0600		54	1200	
	24	59		1200	94		0400	
			46	2300		50	1200	
	25	58		1200	96		0500	
			40	0600		54	1100	
	26	54		1600	96		0200	
			35	0600		54	1500	
	27	55		1600	94		0400	
			41	0400		52	1600	
	28	59		1300	85		0900	
			36	0800		42	1300	
	29	53		1400	96		0900	
			39	0400		56	1300	
	30	46		1400	94		0200	
			39	0800		72	1400	

Appendix C

SOIL ACTIVITY MEASUREMENTS

Table C-1  
INITIAL SOIL ACTIVITY

Container Number	Corrected $\Delta n$ (mu. gm)	4n Response Factor (mu. d. n)	Well Crystal Efficiency Factor (e. d)	Fallout Simulant Activity (e. m)	Soil Dry Weight (gm)	Soil Activity (e. m gm dry soil)
<u>Co-144</u>						
1	$155.6 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.563 \times 10^3$	$2.02 \times 10^3$	7,626
2	$155.6 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.563 \times 10^3$	$2.00 \times 10^3$	7,702
3	$155.6 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.563 \times 10^3$	$1.93 \times 10^3$	7,981
4	$151.3 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.487 \times 10^3$	$1.98 \times 10^3$	7,101
5	$151.3 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.487 \times 10^3$	$2.00 \times 10^3$	7,327
6	$155.6 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.563 \times 10^3$	$2.00 \times 10^3$	7,702
7	$155.6 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.563 \times 10^3$	$2.03 \times 10^3$	7,388
8	$151.3 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.487 \times 10^3$	$1.99 \times 10^3$	7,384
9	$151.3 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.487 \times 10^3$	$1.95 \times 10^3$	7,515
23	$151.3 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.487 \times 10^3$	$2.01 \times 10^3$	7,291
24	$155.6 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.563 \times 10^3$	$2.00 \times 10^3$	7,702
25	$151.3 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.487 \times 10^3$	$1.95 \times 10^3$	7,515
26	$151.3 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.487 \times 10^3$	$1.98 \times 10^3$	7,477, 6,716
27	$155.6 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.563 \times 10^3$	$2.00 \times 10^3$	7,702
28	$155.6 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.563 \times 10^3$	$2.01 \times 10^3$	7,663
29	$155.6 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.563 \times 10^3$	$2.00 \times 10^3$	7,702
30	$151.3 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.487 \times 10^3$	$2.00 \times 10^3$	7,326
31	$151.3 \times 10^{-10}$	$0.978 \times 10^{-14}$	0.0936	$1.487 \times 10^3$	$2.00 \times 10^3$	7,326
<u>Ru-106</u>						
15	$156.8 \times 10^{-10}$	$2.7 \times 10^{-14}$	0.226	$1.360 \times 10^3$	$1.92 \times 10^3$	7,069
16	$156.8 \times 10^{-10}$	$2.7 \times 10^{-14}$	0.226	$1.360 \times 10^3$	$1.98 \times 10^3$	6,855
17	$156.8 \times 10^{-10}$	$2.7 \times 10^{-14}$	0.226	$1.360 \times 10^3$	$1.98 \times 10^3$	6,855
18	$156.8 \times 10^{-10}$	$2.7 \times 10^{-14}$	0.226	$1.360 \times 10^3$	$1.98 \times 10^3$	6,925
19	$161.1 \times 10^{-10}$	$2.7 \times 10^{-14}$	0.226	$1.416 \times 10^3$	$1.94 \times 10^3$	7,264
20	$156.8 \times 10^{-10}$	$2.7 \times 10^{-14}$	0.226	$1.360 \times 10^3$	$1.98 \times 10^3$	6,855
36	$156.8 \times 10^{-10}$	$2.7 \times 10^{-14}$	0.226	$1.360 \times 10^3$	$1.93 \times 10^3$	7,033
37	$161.1 \times 10^{-10}$	$2.7 \times 10^{-14}$	0.226	$1.416 \times 10^3$	$1.98 \times 10^3$	7,138
38	$156.8 \times 10^{-10}$	$2.7 \times 10^{-14}$	0.226	$1.360 \times 10^3$	$1.98 \times 10^3$	6,855
39	$156.8 \times 10^{-10}$	$2.7 \times 10^{-14}$	0.226	$1.360 \times 10^3$	$1.96 \times 10^3$	6,925, 6,418
40	$156.8 \times 10^{-10}$	$2.7 \times 10^{-14}$	0.226	$1.360 \times 10^3$	$1.96 \times 10^3$	6,925, 6,418
41	$161.1 \times 10^{-10}$	$2.7 \times 10^{-14}$	0.226	$1.416 \times 10^3$	$1.98 \times 10^3$	7,138
<u>Zr-95-Nb-95</u>						
43	$320.4 \times 10^{-9}$	$13.02 \times 10^{-14}$	0.576	$14.89 \times 10^3$	$1.92 \times 10^3$	75,070
44	$320.4 \times 10^{-9}$	$13.02 \times 10^{-14}$	0.576	$14.89 \times 10^3$	$2.00 \times 10^3$	72,070
45	$320.4 \times 10^{-9}$	$13.02 \times 10^{-14}$	0.576	$14.89 \times 10^3$	$2.00 \times 10^3$	72,070
46	$328.9 \times 10^{-9}$	$13.02 \times 10^{-14}$	0.576	$15.28 \times 10^3$	$1.94 \times 10^3$	76,240
47	$320.4 \times 10^{-9}$	$13.02 \times 10^{-14}$	0.576	$14.89 \times 10^3$	$1.94 \times 10^3$	74,290
48	$328.9 \times 10^{-9}$	$13.02 \times 10^{-14}$	0.576	$15.28 \times 10^3$	$2.02 \times 10^3$	73,220
64	$316.1 \times 10^{-9}$	$13.02 \times 10^{-14}$	0.576	$14.69 \times 10^3$	$1.98 \times 10^3$	72,540
65	$328.9 \times 10^{-9}$	$13.02 \times 10^{-14}$	0.576	$15.28 \times 10^3$	$1.99 \times 10^3$	74,320
66	$328.9 \times 10^{-9}$	$13.02 \times 10^{-14}$	0.576	$15.28 \times 10^3$	$2.00 \times 10^3$	73,960
67	$324.6 \times 10^{-9}$	$13.02 \times 10^{-14}$	0.576	$15.08 \times 10^3$	$1.96 \times 10^3$	74,480, 47,549
68	$328.9 \times 10^{-9}$	$13.02 \times 10^{-14}$	0.576	$15.28 \times 10^3$	$1.96 \times 10^3$	75,470
69	$324.6 \times 10^{-9}$	$13.02 \times 10^{-14}$	0.576	$15.08 \times 10^3$	$1.98 \times 10^3$	73,720

Table O-1 (concluded)

Container Number	Corrected Count (ma gm)	In Response Factor (ma d s)	Well Crystal Efficiency Factor (c d)	Fallout Simulant Activity (c m)	Soil Dry Weight (gm)	Soil Activity (c m gm dry soil)
<b>Cs-137</b>						
49	110.9 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.601 x 10 <sup>-1</sup>	2.00 x 10 <sup>-1</sup>	32,960
50	110.9 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.601 x 10 <sup>-1</sup>	2.02 x 10 <sup>-1</sup>	32,630
51	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	1.92 x 10 <sup>-1</sup>	35,650
52	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	2.00 x 10 <sup>-1</sup>	34,120
53	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	1.96 x 10 <sup>-1</sup>	34,820
54	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	2.02 x 10 <sup>-1</sup>	33,890
55	110.9 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.601 x 10 <sup>-1</sup>	2.03 x 10 <sup>-1</sup>	32,170
56	110.9 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.601 x 10 <sup>-1</sup>	1.96 x 10 <sup>-1</sup>	32,630
57	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	1.91 x 10 <sup>-1</sup>	35,280
58	110.9 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.601 x 10 <sup>-1</sup>	1.98 x 10 <sup>-1</sup>	33,290
59	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	1.96 x 10 <sup>-1</sup>	34,820
60	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	1.92 x 10 <sup>-1</sup>	35,650
61	110.9 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.601 x 10 <sup>-1</sup>	1.92 x 10 <sup>-1</sup>	34,330
70	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	1.96 x 10 <sup>-1</sup>	34,820
71	119.1 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	7.112 x 10 <sup>-1</sup>	2.02 x 10 <sup>-1</sup>	35,110
72	110.9 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.601 x 10 <sup>-1</sup>	1.96 x 10 <sup>-1</sup>	32,630
73	110.9 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.601 x 10 <sup>-1</sup>	1.95 x 10 <sup>-1</sup>	33,810
74	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	1.98 x 10 <sup>-1</sup>	34,570
75	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	2.02 x 10 <sup>-1</sup>	33,890
76	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	2.02 x 10 <sup>-1</sup>	33,890
77	110.9 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.601 x 10 <sup>-1</sup>	1.98 x 10 <sup>-1</sup>	33,290
78	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	1.96 x 10 <sup>-1</sup>	34,820
79	110.9 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.601 x 10 <sup>-1</sup>	1.95 x 10 <sup>-1</sup>	33,810
80	110.9 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.601 x 10 <sup>-1</sup>	1.95 x 10 <sup>-1</sup>	33,810
81	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	1.99 x 10 <sup>-1</sup>	34,290
82	115.2 x 10 <sup>-3</sup>	5.91 x 10 <sup>-14</sup>	0.337	6.858 x 10 <sup>-1</sup>	1.93 x 10 <sup>-1</sup>	35,160
<b>Sr-85</b>						
84	211.2 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.621 x 10 <sup>9</sup>	1.94 x 10 <sup>-1</sup>	8,722
85	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	2.02 x 10 <sup>-1</sup>	8,206
86	202.6 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.555 x 10 <sup>9</sup>	2.01 x 10 <sup>-1</sup>	8,075
87	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	2.02 x 10 <sup>-1</sup>	8,206
88	202.6 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.555 x 10 <sup>9</sup>	1.97 x 10 <sup>-1</sup>	8,239
89	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	2.02 x 10 <sup>-1</sup>	8,206
90	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	2.02 x 10 <sup>-1</sup>	8,206
91	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	2.02 x 10 <sup>-1</sup>	8,206
92	211.2 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.621 x 10 <sup>9</sup>	2.005 x 10 <sup>-1</sup>	8,439
93	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	1.96 x 10 <sup>-1</sup>	8,157
94	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	1.96 x 10 <sup>-1</sup>	8,157
95	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	2.00 x 10 <sup>-1</sup>	8,288
96	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	2.02 x 10 <sup>-1</sup>	8,206
97	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	2.00 x 10 <sup>-1</sup>	8,288
98	211.2 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.621 x 10 <sup>9</sup>	1.96 x 10 <sup>-1</sup>	8,633
99	202.6 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.555 x 10 <sup>9</sup>	1.98 x 10 <sup>-1</sup>	8,198
100	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.171 x 10 <sup>9</sup>	1.97 x 10 <sup>-1</sup>	18" deep
103	211.2 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.621 x 10 <sup>9</sup>	2.005 x 10 <sup>-1</sup>	8,439
104	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	2.02 x 10 <sup>-1</sup>	8,206
105	202.6 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.555 x 10 <sup>9</sup>	1.96 x 10 <sup>-1</sup>	8,282
106	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	1.97 x 10 <sup>-1</sup>	8,414, 6,125
107	202.6 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.555 x 10 <sup>9</sup>	1.98 x 10 <sup>-1</sup>	8,198, 6,260
108	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	1.995 x 10 <sup>-1</sup>	8,309, 6,344
109	202.6 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.555 x 10 <sup>9</sup>	1.98 x 10 <sup>-1</sup>	8,198, 6,260
110	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	1.975 x 10 <sup>-1</sup>	8,394, 6,109
111	202.6 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.555 x 10 <sup>9</sup>	1.98 x 10 <sup>-1</sup>	8,198
122	211.2 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.621 x 10 <sup>9</sup>	1.97 x 10 <sup>-1</sup>	8,589
113	211.2 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.621 x 10 <sup>9</sup>	1.98 x 10 <sup>-1</sup>	8,546
114	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	1.94 x 10 <sup>-1</sup>	8,545
115	211.2 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.621 x 10 <sup>9</sup>	1.96 x 10 <sup>-1</sup>	8,633
116	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	1.93 x 10 <sup>-1</sup>	8,589
117	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	1.95 x 10 <sup>-1</sup>	8,501
118	206.9 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.588 x 10 <sup>9</sup>	1.95 x 10 <sup>-1</sup>	8,501
119	202.6 x 10 <sup>-10</sup>	4.61 x 10 <sup>-14</sup>	0.337	1.555 x 10 <sup>9</sup>	1.97 x 10 <sup>-1</sup>	8,239

Table C-2

DRY WEIGHTS OF SOIL SAMPLES  
(Original 10 gms)

Sand			Clay			Loam			Loam		
Container Number	Sample Number	Dry Weight (gms)	Container Number	Sample Number	Dry Weight (gms)	Container Number	Sample Number	Dry Weight (gms)	Container Number	Sample Number	Dry Weight (gms)
2	201	9.8				3	301	9.4			
	202	9.8					302	9.5			
5	501	9.8				4	401	9.9	78	7801	9.6
	502	9.8					402	9.55		7802	9.6
8	801	9.8	1	101	9.9	9	901	9.55	79	7901	9.55
	802	9.75		102	9.9		902	9.6		7902	9.6
16	1601	9.7	6	601	9.8	15	1501	9.4	80	8001	9.5
	1602	9.7		602	9.8		1502	9.4		8002	9.65
17	1701	9.7	7	701	9.9	18	1801	9.6	81	8101	9.75
	1702	9.7		702	10.0		1802	9.6		8102	9.75
20	2001	9.7	23	2301	9.9	19	1901	9.5	82	8201	9.5
	2002	9.7		2302	9.8		1902	9.5		8202	9.4
21	2101	9.8	28	2801	9.85	25	2501	9.55	84	8401	9.55
	2102	9.8		2802	9.85		2502	9.55		8402	9.5
27	2701	9.8	29	2901	9.8	26	2601	9.7	88	8801	9.6
	2702	9.8		2902	9.8		2602	9.5		8802	9.7
30	3001	9.8	50	5001	9.9	31	3101	9.9	93	9301	9.6
	3002	9.8		5002	9.9		3102	9.7		9302	9.6
37	3701	9.7	54	5401	9.9	36	3601	9.5	94	9401	9.6
	3702	9.7		5402	9.9		3602	9.4		9402	9.6
38	3801	9.7	55	5501	9.9	39	3901	9.6	98	9801	9.6
	3802	9.7		5502	10.0		3902	9.6		9802	9.6
41	4101	9.7	71	7101	9.9	40	4001	9.6	99	9901	9.7
	4102	9.7		7102	9.85		4002	9.6		9902	9.7
41	4101	9.8	75	7501	9.9	43	4301	9.4			
	4102	9.8		7502	9.9		4302	9.4			
45	4501	9.8	76	7601	9.9	46	4601	9.5	105	10501	9.6
	4502	9.8		7602	9.9		4602	9.5		10502	9.65
48	4801	9.9	85	8501	9.9	47	4701	9.5	106	10601	9.65
	4802	9.9		8502	9.85		4702	9.5		10602	9.65
49	4901	9.8	89	8901	9.9	51	5101	9.4	107	10701	9.7
	4902	9.8		8902	9.9		5102	9.4		10702	9.75
53	5301	9.6	90	9001	9.9	52	5201	9.8	108	10801	9.75
	5302	9.6		9002	9.85		5202	9.8		10802	9.8
56	5601	9.65	95	9501	9.8	57	5701	9.55	109	10901	9.7
	5602	9.6		9502	9.8		5702	9.5		10902	9.7
65	6501	9.75	96	9601	9.9	58	5801	9.7	110	11001	9.65
	6502	9.75		9602	9.85		5802	9.7		11002	9.7
66	6601	9.8	104	10401	9.85	59	5901	9.6	111	11101	9.7
	6602	9.8		10402	9.9		5902	9.6		11102	9.7
69	6901	9.7				60	6001	9.4	112	11201	9.7
	6902	9.7					6002	9.45		11202	9.6
70	7001	9.65				61	6101	9.4	113	11301	9.7
	7002	9.6					6102	9.4		11302	9.7
74	7401	9.7				64	6401	9.6	114	11401	9.5
	7402	9.7					6402	9.6		11402	9.5
77	7701	9.75				67	6701	9.6	115	11501	9.6
	7702	9.7					6702	9.6		11502	9.65
86	8601	9.9				68	6801	9.6	116	11601	9.4
	8602	9.8					6802	9.6		11602	9.5
87	8701	9.9				72	7201	9.6	117	11701	9.6
	8702	9.9					7202	9.6		11702	9.55
91	9101	9.9				73	7301	9.6	118	11801	9.5
	9102	9.85					7302	9.5		11802	9.6
92	9201	9.85							119	11901	9.7
	9202	9.8								11902	9.65
97	9701	9.8									
	9702	9.8									
103	10301	9.8									
	10302	9.85									

Appendix D

PLANT UPTAKE SUMMARY SHEETS

Table D-1

## PLANT UPTAKE SUMMARY: BEANS

Soil: SAND

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 8,439

Container Number: 103

Date Planted: July 23, 1965

Date Emerged: July 30, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
10303	Shoot	12	1	0.4321	0.4321	22,280	6.11
10304	Shoot	17	14	7.2180	7.2180	878,283	14.4
10306	Stem	27	4	1.8980	1.8980	173,958	10.9
10308	Stem	35	2	2.4405	2.4405	190,858	9.27
10310	Stem	42	2	1.4365	1.4365	113,644	9.37
10313	Stem	53	2	4.6686	4.6686	271,179	6.88
10316	Stem	63	2	4.5926	4.5926	257,022	6.63
10320	Stem	74	1	2.8366	2.8366	257,930	10.8
10324	Stem	87	20	34.1555	7.7455	643,979	9.85
10305	Leaves	27	4	4.9357	4.9357	650,198	15.6
10307	Leaves	35	2	5.0321	5.0321	700,703	16.5
10309	Leaves	42	2	2.7579	2.7579	311,631	13.4
10312	Leaves	53	2	5.7074	5.7074	641,917	13.3
10315	Leaves	63	2	4.0292	4.0292	471,388	13.9
10319	Leaves	74	1	1.7795	1.7795	314,155	20.9
10323	Leaves	87	20	3.9250	3.9250	496,186	15.0
10311	Blossom	42	2	0.0754	0.0754	3,323	5.22
10314	Pod	53	2	0.7616	0.7616	26,945	4.19
10317	Pod	63	2	2.5229	2.5229	68,349	3.21
10321	Pod	74	1	2.7105	2.7105	105,570	4.62
10325	Pod	87	20	26.3820	10.2020	520,170	6.04
10318	Fruit	63	2	0.0573	0.0573	275	0.569
10322	Fruit	74	1	2.0197	2.0197	6,406	0.376
10326	Fruit	87	20	53.8181	53.8181	111,412	0.245
10327	Root	87	14	5.2130	5.2130	222,962	5.07



Table D-2

## PLANT UPTAKE SUMMARY: BEANS

Soil: LOAM

Radionuclide: SR-H5

Initial Soil Activity (c/m/gm): 8,282

Container Number: 105

Date Planted: July 23, 1965

Date Emerged: July 31, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>5</sup> SU
10504	Stem	27	5	1.0657	1.0657	41,647	4.72
10506	Stem	35	5	1.9362	1.9362	56,310	3.51
10508	Stem	42	3	2.6968	2.6968	50,918	2.55
10511	Stem	53	2	2.9675	2.9675	54,558	2.22
10514	Stem	63	5	6.9031	6.9031	98,572	1.72
10518	Stem	74	1	6.9925	6.9925	59,196	1.02
10522	Stem	104	19	61.8721	12.5521	104,838	1.01
10503	Leaves	27	5	2.7750	2.7750	165,423	7.20
10505	Leaves	35	5	5.0009	5.0009	245,825	5.94
10507	Leaves	42	3	6.0690	6.0690	286,569	5.70
10510	Leaves	53	2	6.1832	6.1832	286,441	5.59
10513	Leaves	63	5	10.4870	10.4870	478,098	5.50
10517	Leaves	74	1	7.7175	7.7175	235,053	3.68
10521	Leaves	104	19	68.5383	10.9783	363,184	3.99
10509	Blossom	42	3	0.2135	0.2135	2,009	1.14
10512	Blossom	53	2	0.2811	0.2811	2,636	1.13
10515	Blossom	63	5	0.3131	0.3131	5,290	2.04
10516	Pod	63	5	1.1132	1.1132	5,614	0.609
10519	Pod	74	1	5.4190	5.4190	16,854	0.376
10523	Pod	104	19	50.1987	12.6587	41,652	0.397
10520	Fruit	74	1	0.4215	0.4215	220	0.0630
10524	Fruit	104	19	140.620	140.620	18,948	0.0163
10525	Root	104	11	6.9172	6.9172	47,073	0.822

Table D-3

## PLANT UPTAKE SUMMARY: DEANS

Soil: CLAY

Radionuclide: SR-N5

Initial Soil Activity (c/m/gm): 8,206

Container Number: 104

Date Planted: July 23, 1965

Date Emerged: July 30, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>85</sup> SU
10403	Shoot	12	1	0.4049	0.4049	8,795	2.65
10404	Shoot	17	17	7.4140	7.4140	184,415	3.03
10406	Stem	27	5	1.2245	1.2245	23,536	2.34
10408	Stem	35	6	1.7873	1.7873	24,892	1.70
10410	Stem	42	3	1.2423	1.2423	26,566	2.61
10413	Stem	53	4	1.4865	1.4865	26,938	2.21
10416	Stem	63	2	2.6439	2.6439	40,012	1.84
10420	Stem	74	1	0.8030	0.8030	14,583	2.21
10424	Stem	97	23	15.9960	8.4460	139,131	2.01
10405	Leaves	27	5	2.5800	2.5800	84,457	3.99
10407	Leaves	35	6	3.3300	3.3300	85,248	3.12
10409	Leaves	42	3	2.8223	2.8223	105,137	4.54
10412	Leaves	53	4	2.1574	2.1574	56,980	3.22
10415	Leaves	63	2	2.9828	2.9828	103,786	4.24
10419	Leaves	74	1	0.8406	0.8406	44,554	6.46
10423	Leaves	97	23	7.3101	7.3101	343,101	5.72
10411	Blossom	42	3	0.1075	0.1075	1,131	2.19
10414	Blossom	53	4	0.1109	0.1109	1,828	2.01
10417	Pod	63	2	2.1818	2.1818	21,663	1.21
10421	Pod	74	1	1.1681	1.1681	12,646	1.32
10425	Pod	97	23	23.2474	8.1674	114,533	1.71
10418	Fruit	63	2	0.0512	0.0512	86	0.205
10422	Fruit	74	1	0.6890	0.6890	1,100	0.195
10426	Fruit	97	23	57.5225	57.5225	50,271	0.106
10427	Root	97	11	2.2650	2.2650	16,242	0.874

Table D-4

## PLANT UPTAKE SUMMARY: BEANS

Soil: SAND

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 34,990

Container Number: 53

Date Planted: July 15, 1965

Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
5303	Shoot	13	1	0.3962	0.3962	2,071	0.152
5304	Shoot	20	1	0.9064	0.9064	5,868	0.189
5305	Shoot	25	15	16.6650	16.6650	120,617	0.211
5307	Stem	29	2	0.9802	0.9802	3,378	0.101
5309	Stem	41	3	3.0975	3.0975	9,852	0.0928
5312	Stem	48	3	5.6008	5.6008	12,622	0.0657
5315	Stem	55	5	9.6175	9.6175	21,994	0.0667
5318	Stem	67	3	6.8983	6.8983	16,133	0.0669
5322	Stem	78	1	1.3088	1.3088	2,821	0.0616
5326	Stem	81	18	33.4150	8.3150	24,291	0.0835
5306	Leaves	29	2	2.2416	2.2416	11,574	0.151
5308	Leaves	41	3	4.9983	4.9983	25,070	0.146
5311	Leaves	48	3	7.8717	7.8717	27,532	0.102
5314	Leaves	55	5	9.3746	9.3746	33,960	0.106
5317	Leaves	67	3	4.0047	4.0047	10,043	0.0717
5321	Leaves	78	1	0.2739	0.2739	683	0.0632
5325	Leaves	81	18	15.0605	15.0605	61,320	0.116
5310	Blossom	41	3	0.2805	0.2805	1,509	0.157
5313	Blossom	48	3	0.1887	0.1887	417	0.0644
5316	Pod	55	5	6.2101	6.2101	15,559	0.0731
5319	Pod	67	3	7.9599	7.9599	16,658	0.0598
5323	Pod	78	1	1.0229	1.0229	2,763	0.0772
5327	Pod	81	18	28.1480	8.4980	29,419	0.0979
5320	Fruit	67	3	3.0971	3.0971	6,526	0.0602
5324	Fruit	78	1	1.5715	1.5715	2,093	0.0381
5328	Fruit	81	18	54.9450	54.9450	88,974	0.0463
5329	Root	81	10	3.9090	3.9090	18,026	0.132

Table D-5

## PLANT UPTAKE SUMMARY: BEANS

Soil: LOAM

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 34,290

Container Number: 52

Date Planted: July 15, 1965

Date Emerged: July 25, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
5203	Shoot	13	1	0.3530	0.3530	649	0.0536
5204	Shoot	20	1	0.3569	0.3569	1,189	0.122
5205	Shoot	29	5	1.5795	1.5795	5,839	0.108
5208	Stem	48	3	0.9675	0.9675	850	0.0256
5210	Stem	55	5	1.2605	1.2605	1,693	0.0392
5212	Stem	67	3	1.9189	1.9189	1,684	0.0256
5215	Stem	78	1	1.7778	1.7778	960	0.0158
5219	Stem	92	4	11.8505	11.8505	4,190	0.0103
5223	Stem	112	10	24.0865	8.6565	4,847	0.0163
5207	Leaves	48	3	2.5220	2.5220	4,160	0.0481
5209	Leaves	55	5	2.5055	2.5055	6,987	0.0813
5211	Leaves	67	3	4.2410	4.2410	12,829	0.0882
5214	Leaves	78	1	3.1896	3.1896	7,130	0.0652
5218	Leaves	92	4	12.0363	12.0363	15,263	0.0370
5222	Leaves	112	10	22.6020	10.3820	17,168	0.0482
5213	Blossom	67	3	0.0935	0.0935	54	0.0168
5216	Pod	78	1	1.2875	1.2875	263	0.00596
5220	Pod	92	4	10.5729	10.5729	1,155	0.00318
5224	Pod	112	10	26.4507	8.2707	1,765	0.00622
5217	Fruit	78	1	0.6263	0.6263	124	0.00577
5221	Fruit	92	4	12.9921	12.9921	495	0.00111
5225	Fruit	112	10	53.0966	53.0966	2,835	0.00156
5226	Root	112	10	4.2190	4.2190	7,064	0.0488

Table D-6

## PLANT UPTAKE SUMMARY: BEANS

Soil: CLAY

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 33,950

Container Number: 54

Date Planted: July 15, 1965

Date Emerged: July 21, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>137</sup> SU
5403	Shoot	13	1	0.3602	0.3602	832	0.0680
5404	Shoot	20	1	0.6737	0.6737	2,633	0.115
5405	Shoot	25	15	11.2242	11.2242	39,897	0.105
5407	Stem	29	2	0.7800	0.7800	2,076	0.0784
5409	Stem	41	4	1.9968	1.9968	5,010	0.0739
5412	Stem	48	3	1.5252	1.5252	3,967	0.0766
5415	Stem	55	3	1.9354	1.9354	2,324	0.0354
5418	Stem	67	3	2.6469	2.6469	2,414	0.0269
5422	Stem	78	2	0.8296	0.8296	1,209	0.0429
5426	Stem	84	18	11.2586	11.2586	12,149	0.0318
5406	Leaves	29	2	1.5328	1.5328	6,221	0.120
5408	Leaves	41	4	3.5010	3.5010	13,157	0.111
5411	Leaves	48	3	2.5290	2.5290	8,012	0.0933
5414	Leaves	55	3	2.6632	2.6632	4,361	0.0482
5417	Leaves	67	3	3.3573	3.3573	4,266	0.0374
5421	Leaves	78	2	0.5336	0.5336	1,033	0.0570
5425	Leaves	84	18	3.2481	3.2481	5,348	0.0485
5410	Blossom	41	4	0.1877	0.1877	594	0.0932
5413	Blossom	48	3	0.7812	0.7812	2,657	0.100
5416	Pod	55	3	1.3295	1.3295	1,258	0.0279
5419	Pod	67	3	3.7388	3.7388	2,186	0.0172
5423	Pod	78	2	1.0697	1.0697	1,163	0.0320
5427	Pod	84	18	13.2996	13.2996	13,268	0.0294
5420	Fruit	67	3	0.7541	0.7541	621	0.0243
5424	Fruit	78	2	2.4999	2.4999	1,134	0.0134
5428	Fruit	84	18	34.7553	34.7553	16,216	0.0137
5429	Root	84	11	2.1993	2.1993	12,881	0.172

Table D-7

## PLANT UPTAKE SUMMARY: BEANS

Soil: SAND

Radionuclide: RU-108

Initial Soil Activity (c/m/gm): 0,858

Container Number: 17

Date Planted: July 8, 1965

Date Emerged: July 15, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>8</sup> SU
1703	Shoot	11	1	0.3500	0.3500	1,401	0.584
1704	Shoot	20	1	1.1343	1.1343	7,111	0.914
1705	Shoot	27	1	1.2862	1.2862	8,174	0.927
1707	Stem	36	1	1.1191	1.1491	1,285	0.183
1709	Stem	47	1	1.9256	1.9256	852	0.0646
1712	Stem	54	1	2.7744	2.7744	1,109	0.0583
1715	Stem	61	1	3.0175	3.0175	1,017	0.0492
1719	Stem	70	1	3.5906	3.5906	1,044	0.0424
1723	Stem	81	11	33.4372	8.2672	10,134	0.179
1706	Leaves	36	1	2.2560	2.2560	14,915	0.964
1708	Leaves	47	1	2.8038	2.8038	4,718	0.246
1711	Leaves	54	1	3.6991	3.6991	6,887	0.272
1714	Leaves	61	1	3.6425	3.6425	9,602	0.384
1718	Leaves	70	1	3.5597	3.5597	6,414	0.263
1722	Leaves	81	11	25.4459	9.0659	41,131	0.662
1710	Blossom	47	1	0.1615	0.1615	89	0.0804
1713	Pod	54	1	2.1345	2.1345	391	0.0267
1716	Pod	61	1	4.3037	4.3037	431	0.0146
1720	Pod	70	1	5.7668	5.7668	466	0.0118
1724	Pod	81	11	40.2115	9.0315	4,829	0.0780
1717	Fruit	61	1	0.5032	0.5032	0	0.0
1721	Fruit	70	1	3.5077	3.5077	26	0.00108
1725	Fruit	81	11	85.8200	85.8200	782	0.00133
1726	Root	81	14	3.5811	3.5811	50,893	2.07

Table D-8

## PLANT UPTAKE SUMMARY: BEANS

Soil: LOAM

Radionuclide: RU-106

Initial Soil Activity (c/m/gm): 6,925

Container Number: 18

Date Planted: July 8, 1965

Date Emerged: July 18, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
1803	Shoot	20	1	0.8580	0.8580	1,905	0.321
1805	Stem	36	1	0.3732	0.3732	190	0.0735
1807	Stem	47	1	0.3287	0.3287	239	0.105
1809	Stem	54	1	1.4414	1.4414	294	0.0295
1812	Stem	70	1	4.2645	4.2645	480	0.0163
1816	Stem	104	10	23.3807	10.6907	1,552	0.0210
1804	Leaves	36	1	0.9454	0.9454	1,653	0.252
1806	Leaves	47	1	0.7048	0.7048	1,573	0.322
1808	Leaves	54	1	3.5589	3.5589	2,156	0.0875
1811	Leaves	70	1	5.9798	5.9798	3,378	0.0816
1815	Leaves	104	10	17.8877	7.6077	9,014	0.171
1810	Blossom	54	1	0.1584	0.1584	13	0.0119
1813	Pod	70	1	3.0325	3.0325	50	0.00238
1817	Pod	104	10	16.6629	10.4029	680	0.00944
1814	Fruit	70	1	0.3316	0.3316	20	0.00871
1818	Fruit	104	10	42.5384	42.5384	254	0.000862
1819	Root	104	8	3.6535	3.6535	4,813	0.190

Table D-9

## PLANT UPTAKE SUMMARY: BEANS

Soil: SAND

Radionuclide: ZR-NB-95

Initial Soil Activity (c/m/gm): 72,070

Container Number: 44

Date Planted: July 15, 1965

Date Emerged: July 21, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
4403	Shoot	13	1	0.4720	0.4720	1,374	0.0404
4404	Shoot	20	1	0.7259	0.7259	2,397	0.0458
4405	Shoot	25	19	22.8075	22.8075	83,190	0.0506
4407	Stem	29	2	1.0466	1.0466	851	0.0113
4409	Stem	40	2	3.3165	3.3165	2,017	0.00844
4412	Stem	48	3	6.3419	6.3419	2,838	0.00621
4416	Stem	54	1	3.7855	3.7855	1,531	0.00561
4419	Stem	63	2	6.8622	6.8622	2,659	0.00538
4423	Stem	75	2	3.6686	3.6686	2,026	0.00766
4427	Stem	81	17	29.8530	6.7530	7,084	0.0146
4406	Leaves	29	2	2.4403	2.4403	8,174	0.0465
4408	Leaves	40	2	6.2695	6.2695	18,173	0.0402
4411	Leaves	48	3	8.3191	8.3191	12,919	0.0216
4415	Leaves	54	1	4.4294	4.4294	6,237	0.0195
4418	Leaves	63	2	5.5932	5.5932	6,349	0.0158
4422	Leaves	75	2	1.4247	1.4247	3,370	0.0328
4426	Leaves	81	17	9.5937	9.5937	51,541	0.0745
4410	Blossom	40	2	0.3378	0.3378	221	0.00908
4414	Blossom	48	3	0.6012	0.6012	225	0.00519
4413	Pod	48	3	0.7460	0.7460	162	0.00301
4417	Pod	54	1	1.2259	1.2259	167	0.00189
4420	Pod	63	2	7.7647	7.7647	839	0.00150
4424	Pod	75	2	3.6682	3.6682	1,194	0.00452
4428	Pod	81	17	28.0210	8.6610	3,216	0.00515
4421	Fruit	63	2	2.0401	2.0401	28	0.000190
4425	Fruit	75	2	4.5393	4.5393	11	0.000033
4429	Fruit	81	17	51.8408	51.8408	513	0.000137
4430	Root	81	10	4.3405	4.3405	77,723	0.248



Table D-10

## PLANT UPTAKE SUMMARY: BEANS

Soil: LOAM

Radionuclide: ZR-NB-95

Initial Soil Activity (c/m/gm): 75,070

Container Number: 43

Date Planted: July 15, 1965

Date Emerged: July 22, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
4303	Shoot	13	1	0.3048	0.3048	872	0.0381
4304	Shoot	20	1	0.6082	0.6082	1,119	0.0245
4306	Stem	29	4	1.1035	1.1035	940	0.0114
4308	Stem	40	6	3.2370	3.2370	4,141	0.0170
4310	Stem	48	3	4.2875	4.2875	1,064	0.00331
4313	Stem	54	2	4.9100	4.9100	780	0.00212
4316	Stem	63	1	3.4580	3.4580	264	0.00102
4320	Stem	75	2	4.1882	4.1882	798	0.00254
4324	Stem	95	18	52.4109	10.9309	3,979	0.00485
4305	Leaves	29	4	2.5160	2.5160	5,899	0.0312
4307	Leaves	40	6	7.2620	7.2620	14,476	0.0266
4309	Leaves	48	3	9.1685	9.1685	11,669	0.0170
4312	Leaves	54	2	10.0120	10.0120	2,630	0.00350
4315	Leaves	63	1	5.0536	5.0536	1,123	0.00296
4319	Leaves	75	2	5.5296	5.5296	6,533	0.0157
4323	Leaves	95	18	34.3756	9.9556	42,041	0.0562
4311	Blossom	48	3	0.3457	0.3457	1,218	0.0469
4314	Blossom	54	2	0.4112	0.4112	71	0.00230
4317	Pod	63	1	3.5430	3.5430	114	0.000429
4321	Pod	75	2	2.7735	2.7735	103	0.000495
4325	Pod	95	18	32.6171	9.6071	1,612	0.00224
4318	Fruit	63	1	0.6483	0.6483	18	0.000370
4322	Fruit	75	2	0.8435	0.8435	8	0.000126
4326	Fruit	95	18	87.7143	87.7143	223	0.000034
4327	Root	95	11	6.0924	6.0924	23,642	0.0517

Table D-11

## PLANT UPTAKE SUMMARY: BEANS

Soil: SAND

Container Number: 8

Radionuclide: CE-144

Date Planted: July 8, 1965

Initial Soil Activity (c/m/gm): 7,364

Date Emerged: July 15, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
803	Shoot	11	1	0.3284	0.3284	449	0.186
804	Shoot	20	1	0.9829	0.9829	1,819	0.251
805	Shoot	27	1	0.5305	0.5305	787	0.202
807	Stem	36	1	0.9069	0.9069	434	0.0650
809	Stem	46	1	3.4607	3.4607	449	0.0176
812	Stem	54	1	2.8545	2.8545	441	0.0210
816	Stem	61	1	2.9734	2.9734	428	0.0195
820	Stem	70	1	4.1811	4.1811	605	0.0197
824	Stem	81	11	40.9896	6.3896	1,237	0.0263
806	Leaves	36	1	2.0712	2.0712	2,701	0.177
808	Leaves	46	1	4.2187	4.2187	1,753	0.0564
811	Leaves	54	1	3.5047	3.5047	1,937	0.0751
815	Leaves	61	1	3.0850	3.0850	1,337	0.0589
819	Leaves	70	1	3.0809	3.0809	1,565	0.0690
823	Leaves	81	11	17.3480	17.3480	31,422	0.246
810	Blossom	46	1	0.3688	0.3688	19	0.0070
814	Blossom	54	1	0.1237	0.1237	0	0.0
813	Pod	54	1	0.9799	0.9799	15	0.00208
817	Pod	61	1	4.2933	4.2933	122	0.00386
821	Pod	70	1	3.8663	3.8663	87	0.00306
825	Pod	81	11	34.7892	10.5892	1,068	0.0137
818	Fruit	61	1	0.7953	0.7953	0	0.0
822	Fruit	70	1	1.9703	1.9703	0	0.0
826	Fruit	81	11	76.900	76.900	371	0.000655
827	Root	81	11	7.0498	7.0498	14,208	0.274

Table D-12

## PLANT UPTAKE SUMMARY: BEANS

Soil: LOAM

Radionuclide: CE-144

Initial Soil Activity (c/m/gm): 7,515

Container Number: 9

Date Planted: July 8, 1965

Date Emerged: July 18, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
905	Shoot	46	2	0.9840	0.9840	583	0.0788
904	Stem	36	1	0.2945	0.2945	46	0.0208
907	Stem	54	1	0.8234	0.8234	128	0.0207
909	Stem	70	1	8.5150	8.5150	224	0.00350
913	Stem	118	11	45.5419	10.4119	734	0.00938
903	Leaves	36	1	0.9274	0.9274	516	0.0740
906	Leaves	54	1	2.1364	2.1364	585	0.0364
908	Leaves	70	1	12.2377	12.2377	1,287	0.0140
912	Leaves	118	11	32.0975	10.5375	7,392	0.0934
910	Pod	70	1	4.1125	4.1125	12	0.000389
914	Pod	118	11	41.8656	10.9356	315	0.00383
911	Fruit	70	1	0.0808	0.0808	14	0.0231
915	Fruit	118	11	118.7133	118.7133	281	0.000315
916	Root	118	7	5.2802	5.2802	3,696	0.0932

Table D-13

## PLANT UPTAKE SUMMARY: BEANS

Soil: CLAY

Radionuclide: CE-144

Initial Soil Activity (c/m/gm): 7,588

Container Number: 7

Date Planted: July 8, 1965

Date Emerged: July 16, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
703	Shoot	20	1	0.7242	0.7242	544	0.0990
704	Shoot	27	1	0.4489	0.4489	315	0.0925
705	Shoot	36	2	1.1438	1.1438	575	0.0662
707	Stem	46	2	0.7560	0.7560	423	0.0737
709	Stem	54	3	1.2847	1.2847	756	0.0776
712	Stem	70	1	2.9026	2.9026	404	0.0184
715	Stem	81	1	1.2545	1.2545	772	0.0811
719	Stem	81	1	2.4091	2.4091	317	0.0173
722	Stem	90	13	17.0122	17.0122	4,271	0.0331
706	Leaves	46	2	1.5245	1.5245	893	0.0772
708	Leaves	54	3	2.4445	2.4445	1,488	0.0802
711	Leaves	70	1	3.7210	3.7210	1,272	0.0450
718	Leaves	81	1	2.4501	2.4501	1,183	0.0636
721	Leaves	90	13	9.8318	9.8318	8,440	0.113
710	Blossom	54	3	0.1256	0.1256	13	0.0136
713	Pod	70	1	3.1876	3.1876	49	0.00203
716	Pod	81	1	1.8695	1.8695	235	0.0166
720	Pod	81	1	0.2822	0.2822	80	0.0374
723	Pod	90	13	24.3095	10.1595	798	0.0104
714	Fruit	70	1	0.0658	0.0658	3.5	0.00701
717	Fruit	81	1	4.7917	4.7917	30	0.000825
724	Fruit	90	13	44.9848	44.9848	16	0.000047
725	Root	90	8	2.4144	2.4144	6,199	0.338

Table D-14

## PLANT UPTAKE SUMMARY: BEANS

Soil: SAND

Radionuclide: Control

Initial Soil Activity (c/m/gm): -

Container Number: 13

Date Planted: July 15, 1965

Date Emerged: July 21, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Container Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
1301	Shoot	13	1	0.5011	0.5011	43	
1302	Shoot	20	1	1.1627	1.1627	39	
1303	Shoot	25	20	14.0157	14.0157	112	
1305	Stem	32	2	1.6029	1.6029	30	
1308	Stem	42	1	1.4474	1.4474	0	
1310	Stem	50	2	4.9108	4.9108	32	
1314	Stem	63	2	4.0873	4.0873	11	
1318	Stem	75	2	3.2157	3.2157	11	
1322	Stem	81	15	27.9260	7.9960	16	
1304	Leaves	32	2	3.2860	3.2860	44	
1306	Leaves	42	1	2.4905	2.4905	24	
1309	Leaves	50	2	5.7523	5.7523	134	
1313	Leaves	63	2	4.4320	4.4320	20	
1317	Leaves	75	2	2.7066	2.7066	10	
1321	Leaves	81	15	14.7460	14.7460	96	
1307	Blossom	42	1	0.1646	0.1646	0	
1312	Blossom	50	2	0.2335	0.2335	14	
1311	Pod	50	2	1.2582	1.2582	10	
1315	Pod	63	2	4.7650	4.7650	16	
1319	Pod	75	2	2.9989	2.9989	0	
1323	Pod	81	15	27.3583	8.2883	70	
1316	Fruit	63	2	0.8034	0.8034	0	
1320	Fruit	75	2	4.5579	4.5579	0	
1324	Fruit	81	15	52.7404	52.7404	0	
1325	Root	81	10	5.2500	5.2500	0	

Table L-15

## PLANT UPTAKE SUMMARY: BEANS

Soil: LOAM  
 Radionuclide: Control  
 Initial Soil Activity (c/m/gm): -

Container Number: 14  
 Date Planted: July 15, 1965  
 Date Emerged: July 22, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
1401	Shoot	13	1	0.3138	0.3138	28	
1402	Shoot	20	3	0.7802	0.7802	0	
1403	Shoot	25	10	4.5105	4.5105	127	
1405	Stem	32	4	0.9202	0.9202	16	
1407	Stem	42	2	1.0606	1.0606	4	
1409	Stem	50	2	1.6058	1.6058	18	
1412	Stem	63	2	4.8500	4.8500	10	
1416	Stem	75	2	5.4605	5.4605	18	
1420	Stem	105	17	36.2299	8.5699	83	
1404	Leaves	32	4	1.7953	1.7953	93	
1406	Leaves	42	2	2.4567	2.4567	115	
1408	Leaves	50	2	4.3690	4.3690	86	
1411	Leaves	63	2	7.6116	7.6116	29	
1415	Leaves	75	2	6.2609	6.2609	221	
1419	Leaves	105	17	18.1410	9.2860	286	
1410	Blossom	50	2	0.1264	0.1264	0	
1413	Pod	63	2	2.5689	2.5689	0	
1417	Pod	75	2	4.3548	4.3548	17	
1421	Pod	105	17	25.9305	9.1655	26	
1414	Fruit	63	2	0.1321	0.1321	0	
1418	Fruit	75	2	0.7226	0.7226	14	
1422	Fruit	105	17	62.9052	62.9052	31	
1423	Root	105	9	3.7477	3.7477	0	

Table D-16

## PLANT UPTAKE SUMMARY: BEANS

Soil: CLAY

Radionuclide: Control

Initial Soil Activity (c/m/gm): -

Container Number: 12

Date Planted: July 8, 1965

Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
1201	Shoot	20	1	0.3972	0.3972	42	
1202	Shoot	27	1	0.5374	0.5374	46	
1204	Stem	39	3	0.4882	0.4882	23	
1206	Stem	49	1	0.6299	0.6299	0	
1208	Stem	56	2	1.2545	1.2545	20	
1211	Stem	70	1	0.9161	0.9161	0	
1214	Stem	91	15	8.3175	8.3175	254	
1203	Leaves	39	3	0.9197	0.9197	27	
1205	Leaves	49	1	1.2802	1.2802	13	
1207	Leaves	56	2	2.5377	2.5377	118	
1210	Leaves	70	1	1.1453	1.1453	0	
1213	Leaves	91	15	3.3220	3.3220	72	
1209	Blossom	56	2	0.1295	0.1295	0	
1212	Pod	70	1	0.6602	0.6602	0	
1215	Pod	91	15	8.8634	8.8634	86	
1216	Fruit	91	15	16.4540	16.4540	28	
1217	Root	91	12	2.1447	2.1447	5	

Table D-17

## PLANT UPTAKE SUMMARY: CARROTS

Soil: SAND  
 Radionuclide: SR-85  
 Initial Soil Activity (c/m/gm): 8,546

Container Number: 92  
 Date Planted: July 23, 1965  
 Date Emerged: August 10, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup> SU</u>
9207	Shoot	42	20	0.2730	0.2730	21,732	9.43
9208	Shoot	53	20	1.0540	1.0540	84,366	9.49
9209	Shoot	63	10	1.2385	1.2385	94,561	9.05
9210	Whole	74	10	1.4210	1.4210	113,523	9.47
9211	Top	91	10	2.0510	2.0510	128,148	7.40
9213	Top	104	40	9.1870	9.1870	629,211	8.12
9215	Top	116	5	0.6500	0.6500	59,612	10.9
9217	Top	144	30	15.5518	15.5518	748,649	5.70
9212	Root	91	10	2.1312	2.1312	33,911	1.89
9214	Root	104	40	14.1725	14.1725	247,945	2.07
9216	Root	116	5	1.6447	1.6447	41,178	2.97
9218	Root	144	20	26.6400	26.6400	416,972	1.85
9219	Meat	144	10	10.9352	10.9352	138,583	1.50
9220	Peel	144	10	5.6039	5.6039	114,776	2.43



Table D-18

## PLANT UPTAKE SUMMARY: CARROTS

Soil: LOAM  
 Radionuclide: SR-85  
 Initial Soil Activity (c/m/gm): 8,457

Container Number: 93  
 Date Planted: July 23, 1965  
 Date Emerged: August 3, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
9307	Shoot	42	5	0.0774	0.0774	2,899	4.43
9308	Shoot	53	3	0.1888	0.1888	6,855	4.29
9309	Shoot	63	1	0.2839	0.2839	7,889	3.29
9310	Whole	74	4	1.5835	1.5835	29,344	2.19
9311	Top	91	3	2.8746	2.8746	34,872	1.43
9313	Top	104	6	7.2336	7.2336	105,035	1.72
9315	Top	116	2	2.8965	2.8965	37,608	1.54
9317	Top	144	16	46.0021	14.3721	205,678	1.69
9312	Root	91	3	2.1925	2.1925	8,406	0.453
9314	Root	104	6	8.1845	8.1845	20,706	0.299
9316	Root	116	2	2.9720	2.9720	13,074	0.520
9318	Root	144	11	65.3935	29.8935	145,168	0.574
9319	Meat	144	5	31.0890	31.0890	90,711	0.345
9320	Peel	144	5	8.7515	8.7515	49,814	0.673

Table D-19

## PLANT UPTAKE SUMMARY: CARROTS

Soil: LOAM

Container Number: 94

Radionuclide: SR-85

Date Planted: July 23, 1965

Initial Soil Activity (c/m/gm): 8,457

Date Emerged: August 3, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
9407	Shoot	42	10	0.2029	0.2029	6,115	3.56
9408	Shoot	53	2	0.2814	0.2814	7,198	3.02
9409	Shoot	63	2	0.3686	0.3686	10,442	3.35
9410	Whole	74	4	1.6313	1.6313	16,998	1.23
9411	Top	91	7	7.6203	7.6203	45,089	0.700
9413	Top	104	8	10.0035	10.0035	70,353	0.832
9415	Top	116	4	5.1305	5.1305	47,050	1.08
9417	Top	144	6	16.1740	16.1740	167,486	1.22
9412	Root	91	7	5.6596	5.6596	9,986	0.209
9414	Root	104	8	8.7767	8.7767	20,452	0.276
9416	Root	116	4	5.9370	5.9370	24,888	0.496
9418	Root	144	4	27.8755	27.8755	94,194	0.400
9419	Meat	144	2	16.3198	16.3198	40,653	0.295
9420	Peel	144	2	4.9375	4.9375	22,971	0.550

Table D-20

## PLANT UPTAKE SUMMARY: CARROTS

Soil: LOAM

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 8,198

Container Number: 111

Date Planted: July 23, 1965

Date Emerged: Aug. 9, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
11107	Shoot	42	20	0.1514	0.1514	4,637	3.74
11108	Shoot	53	10	0.3463	0.3463	8,943	3.15
11109	Shoot	63	6	0.8145	0.8145	15,162	2.27
11110	Whole	74	8	1.4540	1.4540	26,002	2.18
11111	Top	91	8	3.5905	3.5905	47,887	1.63
11113	Top	104	15	6.1540	6.1540	74,808	1.48
11115	Top	116	3	2.5762	2.5762	43,711	2.07
11117	Top	146	19	34.7101	18.0101	197,719	1.34
11112	Root	91	8	2.7313	2.7313	14,495	0.647
11114	Root	104	15	6.7358	6.7358	25,152	0.456
11116	Root	116	3	5.8366	5.8366	31,020	0.648
11118	Root	146	14	45.9880	23.0580	95,948	0.507
11119	Meat	146	5	14.9063	14.9063	45,731	0.374
11120	Pee l	146	5	7.5255	7.5277	32,165	0.521

Table D-21

## PLANT UPTAKE SUMMARY: CARROTS

Soil: LOAM

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 8,589

Container Number: 112

Date Planted: July 23, 1965

Date Emerged: Aug. 9, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
11207	Shoot	42	20	0.2483	0.2483	6,816	3.20
11208	Shoot	53	10	0.6008	0.6008	12,273	2.38
11209	Shoot	63	6	1.1212	1.1212	16,639	1.73
11210	Whole	74	4	2.1575	2.1575	25,514	1.38
11211	Top	91	10	4.7577	4.7577	43,422	1.06
11213	Top	104	8	4.0685	4.0685	40,164	1.15
11215	Top	116	3	0.9716	0.9716	15,194	1.82
11217	Top	146	15	21.8540	21.8540	248,831	1.33
11212	Root	91	10	2.1660	2.1660	10,036	0.539
11214	Root	104	8	4.0715	4.0715	9,233	0.264
11216	Root	116	3	1.2747	1.2747	6,136	0.561
11218	Root	146	10	20.7839	20.7839	102,991	0.577
11219	Meat	146	5	9.4609	9.4609	40,392	0.497
11220	Peel	146	5	4.8106	4.8106	31,336	0.758

Table D-22

## PLANT UPTAKE SUMMARY: CARROTS

Soil: LOAM

Container Number: 113

Radionuclide: SR-85

Date Planted: July 23, 1965

Initial Soil Activity (c/m/gm): 8,589

Date Emerged: Aug. 9, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
11307	Shoot	42	20	0.2782	0.2782	9,082	3.82
11308	Shoot	53	10	0.6479	0.6479	15,619	2.82
11309	Shoot	63	6	0.9480	0.9480	17,486	2.16
11310	Whole	74	5	2.2593	2.2593	35,877	1.86
11311	Top	91	10	2.4327	2.4327	39,255	1.89
11313	Top	104	12	4.9965	4.9965	75,075	1.76
11315	Top	116	4	1.3602	1.3602	13,219	1.14
11317	Top	146	14	33.5872	19.1872	259,956	1.59
11312	Root	91	10	3.6715	3.6715	9,612	0.306
11314	Root	104	12	6.2206	6.2206	23,839	0.448
11316	Root	116	4	1.8988	1.8988	7,146	0.440
11318	Root	146	9	40.9090	22.1290	104,797	0.554
11319	Meat	146	5	20.4845	20.4845	105,292	0.601
11320	Peel	146	5	7.9153	7.9153	48,688	0.720

Table D-23

## PLANT UPTAKE SUMMARY: CARROTS

Soil: CLAY  
 Radionuclide: SR-85  
 Initial Soil Activity (c/m/gm): 8,288

Container Number: 95  
 Date Planted: July 23, 1965  
 Date Emerged: July 31, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
9507	Shoot	42	20	0.1713	0.1713	4,592	3.23
9508	Shoot	53	20	0.4275	0.4275	12,758	3.60
9509	Shoot	63	10	0.5281	0.5281	16,784	3.83
9510	Whole	74	7	1.0522	1.0522	19,884	2.28
9511	Top	91	9	2.3635	2.3635	24,433	1.25
9513	Top	104	25	5.5120	5.5120	134,829	2.95
9515	Top	116	3	1.2310	1.2310	19,131	1.88
9517	Top	146	15	12.5166	12.5166	118,078	1.14
9512	Root	91	9	1.4115	1.4115	5,974	0.511
9514	Root	104	25	4.8126	4.8126	33,761	0.846
9516	Root	116	3	1.3255	1.3255	7,171	0.653
9518	Root	146	10	18.1897	18.1897	61,617	0.409
9519	Meat	146	5	6.9522	6.9522	23,202	0.403
9520	Peel	146	5	3.6120	3.6120	18,926	0.632

Table D-24

## PLANT UPTAKE SUMMARY: CARROTS

Soil: SAND  
 Radionuclide: CS-137  
 Initial Soil Activity (c/m/gm): 33,350

Container Number: 77  
 Date Planted: July 15, 1965  
 Date Emerged: July 22, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
7707	Shoot	29	27	0.4840	0.4840	3,767	0.233
7708	Shoot	41	20	1.1075	1.1075	8,457	0.229
7709	Shoot	48	20	2.8700	2.8700	21,981	0.230
7710	Top	55	10	4.0874	4.0874	22,858	0.168
7712	Top	67	10	5.3847	5.3847	24,150	0.134
7714	Top	78	20	11.4635	11.4635	62,472	0.163
7716	Top	85	10	4.2366	4.2366	22,285	0.158
7718	Top	92	15	6.8305	6.8305	43,350	0.190
7720	Top	106	3	1.1935	1.1935	4,644	0.117
7722	Top	123	4	1.2458	1.2458	7,280	0.175
7724	Top	151	32	18.1490	9.1190	46,262	0.152
7711	Root	55	10	0.8294	0.8294	3,488	0.126
7713	Root	67	10	2.7499	2.7499	8,468	0.0923
7715	Root	78	20	11.9502	11.9502	26,408	0.0663
7717	Root	85	10	4.4172	4.4172	11,669	0.0792
7719	Root	92	15	10.1976	10.1976	27,671	0.0814
7721	Root	106	3	4.2068	4.2068	13,133	0.0936
7723	Root	123	4	3.6143	3.6143	13,304	0.110
7725	Root	151	22	50.6650	20.9550	57,974	0.0830
7726	Meat	151	10	25.2038	25.2038	42,127	0.0501
7727	Peel	151	10	9.1125	9.1125	40,481	0.133

Table D-25

## PLANT UPTAKE SUMMARY: CARROTS

Soil: LOAM  
 Radionuclide: CS-137  
 Initial Soil Activity (c/m/gm): 34,820

Container Number: 78  
 Date Planted: Aug. 17, 1965  
 Date Emerged: Aug. 30, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
7809	Shoot	45	30	0.4355	0.4355	626	0.0413
7810	Whole	52	6	0.8682	0.8682	554	0.0183
7811	Whole	59	10	1.3392	1.3392	670	0.0144
7812	Top	73	10	2.6905	2.6905	986	0.0105
7814	Top	90	5	1.0182	1.0182	1,758	0.0496
7816	Top	118	21	22.4710	11.7210	5,994	0.0147
7813	Root	73	10	1.2420	1.2420	288	0.00666
7815	Root	90	5	0.6673	0.6673	206	0.00887
7817	Root	118	16	20.4750	20.4750	2,796	0.00392
7818	Meat	118	5	8.0040	8.0040	297	0.00107
7819	Peel	118	5	3.4602	3.4602	1,239	0.0103



Table D-26

## PLANT UPTAKE SUMMARY: CARROTS

Soil: LOAM

Container Number: 79

Radionuclide: CS-137

Date Planted: Aug. 17, 1965

Initial Soil Activity (c/m/gm): 33,810

Date Emerged: Aug. 26, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SI</u>
7909	Shoot	45	30	0.5345	0.5345	843	0.0466
7910	Whole	52	14	0.2705	0.2705	427	0.0467
7911	Whole	59	10	1.0029	1.0029	708	0.0209
7912	Top	73	6	3.1875	3.1875	1,626	0.0151
7914	Top	90	4	1.8415	1.8415	690	0.0111
7916	Top	119	22	32.7978	12.3978	14,060	0.0335
7913	Root	73	6	1.7825	1.7825	353	0.00586
7915	Root	90	4	1.5697	1.5697	259	0.00488
7917	Root	119	17	30.4165	30.4165	4,289	0.00417
7918	Meat	119	5	12.3023	12.3023	577	0.00139
7919	Peel	119	5	4.3975	4.3975	1,443	0.00970

Table D-27

## PLANT UPTAKE SUMMARY: CARROTS

Soil: LOAM  
 Radionuclide: CS-137  
 Initial Soil Activity (c/m/gm): 33,810

Container Number: 80  
 Date Planted: Aug. 17, 1965  
 Date Emerged: Aug. 26, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
8011	Shoot	45	20	0.4326	0.4326	758	0.0518
8012	Whole	52	9	0.7059	0.7059	838	0.0351
8013	Whole	59	10	1.1848	1.1848	548	0.0137
8014	Top	73	7	2.7789	2.7789	1,474	0.0157
8016	Top	90	3	2.0970	2.0970	1,155	0.0163
8018	Top	119	26	45.3635	16.7635	16,658	0.0294
8015	Root	73	7	0.8900	0.8900	216	0.00718
8017	Root	90	3	1.8697	1.8697	540	0.00854
8019	Root	119	18	45.2392	21.4892	2,652	0.00365
8020	Meat	119	8	18.8875	18.8875	613	0.000960
8012	Peel	119	8	6.6940	6.6940	2,134	0.00943

Table D-28

## PLANT UPTAKE SUMMARY: CARROTS

Soil: LOAM

Container Number: 81

Radionuclide: CS-137

Date Planted: Aug. 17, 1965

Initial Soil Activity (c/m/gm): 34,290

Date Emerged: Aug. 26, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
8109	Shoot	45	20	0.3969	0.3969	403	0.0296
8110	Whole	52	14	0.4182	0.4182	607	0.0423
8111	Whole	59	3	0.4431	0.4431	435	0.0286
8112	Top	73	5	1.5172	1.5172	1,073	0.0206
8114	Top	90	4	1.8300	1.8300	1,244	0.0198
8116	Top	119	24	32.9150	9.8450	6,409	0.0190
8113	Root	73	5	0.3220	0.3220	149	0.0135
8115	Root	90	4	0.9973	0.9973	462	0.0135
8117	Root	119	18	34.5365	34.5365	3,659	0.00309
8118	Meat	119	6	10.8620	10.8620	353	0.000948
8119	Peel	119	6	4.7445	4.7445	1,645	0.0101

Table D-29

## PLANT UPTAKE SUMMARY: CARROTS

Soil: LOAM

Container Number: 82

Radionuclide: CS-137

Date Planted: Aug. 17, 1965

Initial Soil Activity (c/m/gm): 35,460

Date Emerged: Aug. 26, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
8211	Shoot	45	30	0.5856	0.5856	1,021	0.0492
8212	Whole	52	6	0.2772	0.2772	392	0.0398
8213	Whole	59	10	0.8668	0.8668	392	0.0128
8214	Top	73	10	4.2253	4.2253	2,726	0.0182
8216	Top	90	4	2.1607	2.1607	1,200	0.0157
8218	Top	119	37	62.6550	14.5550	10,307	0.0200
8215	Root	73	10	1.3555	1.3555	712	0.0148
8217	Root	90	4	1.0618	1.0618	229	0.00608
8219	Root	119	27	56.7550	22.7350	3,933	0.00488
8220	Meat	119	10	27.7750	27.7750	549	0.000558
8221	Peel	119	10	10.5845	10.5845	2,902	0.00773

Table D-30

## PLANT UPTAKE SUMMARY: CARROTS

Soil: CLAY

Container Number: 76

Radionuclide: CS-137

Date Planted: July 15, 1965

Initial Soil Activity (c/m/gm): 33,950

Date Emerged: July 22, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup> SU</u>
7603	Shoot	41	30	0.3266	0.3266	828	0.0747
7604	Whole	48	20	0.7830	0.7830	1,428	0.0537
7605	Whole	55	10	0.8166	0.8166	1,396	0.0504
7606	Top	67	7	1.4623	1.4623	2,426	0.0489
7608	Top	78	20	2.1686	2.1686	3,861	0.0524
7610	Top	85	10	2.1721	2.1721	3,560	0.0483
7612	Top	92	10	2.1552	2.1552	3,189	0.0436
7614	Top	106	10	1.4587	1.4587	3,880	0.0784
7616	Top	123	2	0.9239	0.9239	2,702	0.0862
7618	Top	151	32	17.4290	8.6890	25,108	0.0851
7607	Root	67	7	0.3561	0.3561	309	0.0256
7609	Root	78	20	1.3530	1.3530	1,322	0.0288
7611	Root	85	10	1.4277	1.4277	1,367	0.0282
7613	Root	92	10	2.3813	2.3813	1,840	0.0228
7615	Root	106	10	1.9402	1.9402	1,972	0.0299
7617	Root	123	2	1.2302	1.2302	1,276	0.0305
7619	Root	151	22	31.5055	20.7655	12,914	0.0183
7620	Meat	151	10	15.1157	15.1157	4,061	0.00792
7621	Peel	151	10	6.3065	6.3065	6,306	0.0294

Table D-31

## PLANT UPTAKE SUMMARY: CARROTS

Soil: SAND

Container Number: 37

Radionuclide: RU-106

Date Planted: July 8, 1965

Initial Soil Activity (c/m/gm): 7,138

Date Emerged: July 16, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
3704	Shoot	36	20	0.8202	0.8202	2,352	0.402
3705	Top	47	14	3.2991	3.2991	3,683	0.156
3707	Top	54	20	9.2292	9.2292	5,842	0.0887
3709	Top	61	15	8.6976	8.6976	5,927	0.0955
3711	Top	62	20	13.2054	13.2054	6,890	0.0731
3713	Top	70	7	6.1437	6.1437	4,050	0.0924
3715	Top	81	10	8.8926	8.8926	10,384	0.164
3717	Top	90	3	1.5737	1.5737	3,108	0.277
3719	Top	99	6	2.7533	2.7533	3,809	0.152
3721	Top	113	6	3.4349	3.4349	7,045	0.287
3723	Top	130	5	3.4453	3.4453	6,207	0.252
3725	Top	154	48	42.3080	11.8580	10,727	0.127
3706	Root	47	14	0.3641	0.3641	1,033	0.397
3708	Root	54	20	2.4922	2.4922	13,954	0.784
3710	Root	61	15	3.1983	3.1983	1,782	0.0781
3712	Root	62	20	6.7923	6.7923	3,862	0.0797
3714	Root	70	7	4.2438	4.2438	1,258	0.0415
3716	Root	81	10	18.4481	18.4481	5,399	0.0410
3718	Root	90	3	3.4549	3.4549	793	0.0322
3720	Root	99	6	6.8104	6.8104	2,393	0.0387
3722	Root	113	6	7.9805	7.9805	1,956	0.0343
3724	Root	130	5	18.4636	18.4636	3,252	0.0247
3726	Root	154	38	100.5315	30.4715	10,176	0.0468
3727	Meat	154	10	41.3385	41.3385	2,003	0.00679
3728	Peel	154	10	14.9490	14.9490	17,405	0.163

Table D-32

## PLANT UPTAKE SUMMARY: CARROTS

Soil: LOAM

Radionuclide: RU-106

Initial Soil Activity (c/m/gm): 7,033

Container Number: 36

Date Planted: July 8, 1965

Date Emerged: July 18, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
3604	Top	47	3	0.4040	0.4040	433	0.152
3605	Top	81	6	6.1580	6.1580	2,400	0.0554
3607	Top	90	4	2.0911	2.0911	1,171	0.0796
3609	Top	99	1	1.6676	1.6676	1,095	0.0934
3611	Top	113	1	4.6280	4.6280	3,690	0.113
3613	Top	130	3	7.5897	7.5897	4,821	0.0903
3615	Top	154	14	39.9710	14.1910	5,594	0.0560
3606	Root	81	6	3.1889	3.1889	547	0.0244
3608	Root	90	4	1.2324	1.2324	109	0.0126
3610	Root	99	1	1.4221	1.4221	127	0.0127
3612	Root	113	1	6.5812	6.5812	465	0.0100
3614	Root	130	3	12.3631	12.3631	1,096	0.0126
3616	Root	154	9	47.6230	24.6130	1,845	0.0107
3617	Meat	154	5	55.1495	25.2085	260	0.00147
3618	Peel	154	5	14.2147	14.2147	2,094	0.0209

Table D-33

## PLANT UPTAKE SUMMARY: CARROTS

Soil: SAND

Radionuclide: ZR-NB-95

Initial Soil Activity (c/m/gm): 74,320

Container Number: 65

Date Planted: July 15, 1965

Date Emerged: July 22, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
6505	Shoot	29	35	0.4941	0.4941	3,258	0.0887
6506	Whole	40	25	1.6356	1.6356	5,066	0.0417
6509	Whole	48	10	1.1380	1.1380	3,387	0.0400
6507	Top	48	10	1.3834	1.3834	2,563	0.0249
6510	Top	54	10	3.0043	3.0043	5,160	0.0231
6512	Top	54	10	11.3475	11.3475	19,287	0.0229
6514	Top	63	10	4.1241	4.1241	12,349	0.0403
6516	Top	75	10	8.0805	8.0805	34,162	0.0569
6518	Top	85	10	5.5037	5.5037	23,540	0.0576
6520	Top	92	6	5.5677	5.5677	51,366	0.124
6522	Top	106	10	3.8429	3.8429	18,147	0.0635
6524	Top	123	10	3.6824	3.6824	30,477	0.111
6526	Top	147	44	27.3130	7.8330	78,513	0.135
6508	Root	48	10	0.1891	0.1891	618	0.0440
6511	Root	54	10	0.4927	0.4927	1,380	0.0377
6513	Root	54	10	3.4005	3.4005	8,469	0.0335
6515	Root	63	10	1.5900	1.5900	7,185	0.0608
6517	Root	75	10	8.6912	8.6912	11,202	0.0173
6519	Root	85	10	7.6324	7.6324	8,852	0.0156
6521	Root	92	6	11.1444	11.1444	22,801	0.0275
6523	Root	106	10	10.7702	10.7702	12,765	0.0159
6525	Root	123	10	12.0290	12.0290	20,905	0.0234
6527	Root	147	34	77.638	33.148	71,141	0.0289
6528	Meat	147	10	23.7955	23.7955	6,501	0.00368
6529	Peel	147	10	11.0400	11.0400	67,248	0.0820



Table D-34

## PLANT UPTAKE SUMMARY: CARROTS

Soil: LOAM

Container Number: 64

Radionuclide: ZR-NB-95

Date Planted: July 15, 1965

Initial Soil Activity (c/m/gm): 72,540

Date Emerged: July 25, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
6407	Shoot	54	3	0.6638	0.6638	4,880	0.102
6408	Top	75	6	4.0105	4.0105	14,028	0.0482
6410	Top	92	3	2.1415	2.1415	7,414	0.0477
6412	Top	106	4	3.8905	3.8905	12,769	0.0452
6414	Top	123	3	6.2201	6.2201	34,985	0.0775
6416	Top	147	14	37.1418	16.4218	98,402	0.0826
6409	Root	75	6	1.6715	1.6715	1,578	0.0130
6411	Root	92	3	0.6661	0.6661	820	0.0170
6413	Root	106	4	7.2786	7.2786	3,594	0.00681
6415	Root	123	3	13.7036	13.7036	5,321	0.00535
6417	Root	147	9	53.9987	27.7087	18,903	0.0026
6418	Meat	147	5	33.7945	33.7945	1,728	0.000703
6419	Peel	147	5	11.1985	11.1985	19,777	0.0243

Table D-35

## PLANT UPTAKE SUMMARY: CARROTS

Soil: SAND  
 Radionuclide: CE-144  
 Initial Soil Activity (c/m/gm): 7,702

Container Number: 27  
 Date Planted: July 8, 1965  
 Date Emerged: July 16, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
2704	Shoot	36	20	0.4844	0.4844	2,067	0.554
2705	Whole	49	20	1.6307	1.6307	3,802	0.303
2706	Top	54	20	4.0316	4.0316	7,944	0.256
2708	Top	61	10	3.1681	3.1681	3,741	0.153
2710	Top	62	20	6.5788	6.5788	7,781	0.154
2712	Top	70	10	3.9860	3.9860	4,122	0.130
2714	Top	81	20	12.5086	12.5086	24,531	0.255
2716	Top	91	4	0.8325	0.8325	1,940	0.302
2718	Top	113	10	3.1299	3.1299	11,808	0.490
2720	Top	130	7	1.8412	1.8412	9,474	0.668
2722	Top	154	47	35.0898	10.2698	15,957	0.202
2707	Root	54	20	0.7724	0.7724	770	0.129
2709	Root	61	10	0.9461	0.9461	631	0.0866
2711	Root	62	20	2.2887	2.2887	1,357	0.0770
2713	Root	70	10	1.6607	1.6607	832	0.0650
2715	Root	81	20	15.2400	15.2400	1,869	0.0159
2717	Root	91	4	0.6814	0.6814	303	0.0577
2719	Root	113	10	6.9878	6.9878	1,721	0.0320
2721	Root	130	7	9.6813	9.6813	2,581	0.0346
2723	Root	154	37	75.7272	27.5472	5,016	0.0236
2724	Meat	154	10	38.0785	38.0785	1,144	0.00390
2725	Peel	154	10	10.5040	10.5040	9,388	0.116

Table D-36

## PLANT UPTAKE SUMMARY: CARROTS

Soil: LOAM

Container Number: 26

Radionuclide: CE-144

Date Planted: Aug. 16, 1965

Initial Soil Activity (c/m/gm): 6,683

Date Emerged: Aug. 25, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
2609	Shoot	42	10	0.2414	0.2414	245	0.152
2610	Shoot	51	10	0.5826	0.5826	339	0.0871
2611	Whole	60	20	1.5260	1.5260	3,764	0.369
2612	Top	74	20	6.9139	6.9139	1,642	0.0355
2614	Top	91	8	5.5190	5.5190	2,248	0.0609
2616	Top	115	36	47.2754	12.4554	5,482	0.0659
2613	Root	74	20	2.7182	2.7182	443	0.0244
2615	Root	91	8	5.8876	5.8876	287	0.00729
2617	Root	115	26	44.7550	25.2250	1,153	0.00684
2618	Meat	115	10	24.0682	24.0682	321	0.00200
2619	Peel	115	10	7.6766	7.6766	1,148	0.0224

Table D-37

## PLANT UPTAKE SUMMARY: CARROTS

Soil: CLAY

Container Number: 28

Radionuclide: CE-144

Date Planted: July 8, 1965

Initial Soil Activity (c/m/gm): 7,663

Date Emerged: July 18, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
2804	Whole	46	14	0.1935	0.1935	549	0.370
2805	Whole	54	20	0.6922	0.6922	1,257	0.237
2806	Whole	61	15	1.3245	1.3245	2,318	0.228
2807	Top	70	8	1.3545	1.3545	1,349	0.130
2809	Top	81	10	3.6667	3.6667	3,822	0.136
2811	Top	90	3	1.5657	1.5657	1,428	0.119
2813	Top	99	10	1.5865	1.5865	2,651	0.218
2815	Top	113	10	4.4858	4.4858	10,473	0.305
2817	Top	130	7	3.0672	3.0672	3,769	0.160
2819	Top	154	46	23.4522	9.5022	13,223	0.182
2808	Root	70	8	0.1848	0.1848	145	0.102
2810	Root	81	10	2.6527	2.6527	670	0.0330
2812	Root	90	3	0.5770	0.5770	150	0.0339
2814	Root	99	10	1.4242	1.4242	471	0.0432
2816	Root	113	10	8.5393	8.5393	653	0.00998
2818	Root	130	7	6.2917	6.2917	722	0.0150
2820	Root	154	36	62.8283	32.1683	2,859	0.0116
2821	Meat	154	10	33.3095	33.3095	222	0.000870
2822	Peel	154	10	10.6300	10.6300	5,176	0.0635

Table D-38

## PLANT UPTAKE SUMMARY: CARROT

Soil: SAND

Radionuclide: Control

Initial Soil Activity (c/m/gm): -

Container Number: 63

Date Planted: July 15, 1965

Date Emerged: July 22, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>60</sup> Co
6305	Shoot	32	18	0.4639	0.4639	37	
6306	Whole	42	15	1.7590	1.7590	0	
6307	Top	48	10	2.8905	2.8905	35	
6309	Top	63	20	10.8516	10.8516	112	
6311	Top	75	10	7.4647	7.4647	145	
6313	Top	92	6	2.7910	2.7910	32	
6315	Top	106	10	2.9331	2.9331	232	
6317	Top	154	15	13.1955	13.1955	191	
6308	Root	48	10	0.5333	0.5333	6	
6310	Root	63	20	3.7510	3.7510	32	
6312	Root	75	10	10.2639	10.2639	32	
6314	Root	92	6	5.7110	5.7110	18	
6316	Root	106	10	7.9022	7.9022	10	
6318	Root	154	10	27.4430	27.4430	87	
6319	Meat	154	5	15.9580	15.9580	35	
6320	Peel	154	5	7.5090	7.5090	53	

Table D-39

## PLANT UPTAKE SUMMARY: CARROTS

Soil: CLAY

Container Number: 62

Radionuclide: Control

Date Planted: July 15, 1965

Initial Soil Activity (c/m/gm): -

Date Emerged: July 23, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
6205	Shoot	50	20	0.2223	0.2223	14	
6206	Shoot	63	40	0.7685	0.7685	0	
6207	Shoot	75	6	0.4995	0.4995	4	
6208	Whole	92	10	1.0483	1.0483	11	
6209	Top	106	10	1.2856	1.2856	20	
6210	Root	106	10	1.2151	1.2151	1	

Table D-40

## PLANT UPTAKE SUMMARY: CLOVER

Soil: SAND

Container Number: 86

Radionuclide: SR-85

Date Planted: July 23, 1965

Initial Soil Activity (c/m/gm): 8,075

Date Emerged: July 27, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
8603	Whole	27	15	0.3540	0.3540	43,929	15.4
8604	Whole	35	5	0.4925	0.4925	44,790	11.3
8605	Top	42	8 <sup>a</sup>	2.2421	2.2421	182,473	10.1
8606	Top	53	16 <sup>a</sup>	4.0711	4.0711	276,709	8.42
8607	Top	63	36 <sup>a</sup>	6.4113	6.4113	374,336	7.23
8608	Top	73	36 <sup>a</sup>	7.8035	7.8035	435,153	6.91
8609	Top	81	8 <sup>b</sup>	138.2165	11.2165	551,215	6.09
8610	Top	152	7.3 <sup>b</sup>	169.0875	20.3375	783,813	4.77
8611	Top	327			5.6200	69,562	1.53

a Surface area harvested in square inches

b Surface area harvested in square feet

Table D-41

## PLANT UPTAKE SUMMARY: CLOVER

Soil: LOAM

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 8,722

Container Number: 84

Date Planted: July 23, 1965

Date Emerged: Aug. 2, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
8403	Whole	53	2	0.2720	0.2720	8,956	3.78
8404	Top	63	4 <sup>a</sup>	1.0936	1.0936	26,848	2.81
8405	Top	74	4 <sup>a</sup>	1.7696	1.7696	44,371	2.87
8406	Top	152	3 <sup>b</sup>	162.6130	16.0130	200,452	1.44
8407	Top	327			8.5362	24,269	0.237

a Surface area harvested in square inches

b Surface area harvested in square feet



Table D-42

## PLANT UPTAKE SUMMARY: CLOVER

Soil: CLAY

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 8,206

Container Number: 85

Date Planted: July 23, 1965

Date Emerged: July 30, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
8503	Whole	27	10	0.2025	0.2025	4,546	2.73
8504	Whole	35	5 <sup>a</sup>	0.3806	0.3806	627	2.01
8505	Top	42	4 <sup>a</sup>	1.1569	1.1569	13,635	1.44
8506	Top	53	10 <sup>a</sup>	2.8214	2.8214	49,852	2.15
8507	Top	63	36 <sup>a</sup>	4.8398	4.8398	49,111	1.24
8508	Top	74	36 <sup>a</sup>	5.6521	5.6521	77,797	1.68
8509	Top	81	8 <sup>b</sup>	52.8091	11.1291	131,911	1.44
8510	Top	152	7.3 <sup>b</sup>	71.5510	20.0010	265,249	1.62
8511	Top	327			6.4945	12,620	0.237

a Surface area harvested in square inches

b Surface area harvested in square feet

Table D-43

## PLANT UPTAKE SUMMARY: CLOVER

Soil: SAND

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 34,990

Container Number: 70

Date Planted: July 15, 1965

Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (Days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
7003	Whole	29	6	0.4794	0.4794	2,774	0.165
7004	Whole	41	4 <sup>a</sup>	1.0261	1.0261	3,238	0.0902
7005	Top	48	4 <sup>a</sup>	3.2784	3.2784	11,304	0.0974
7006	Top	55	6 <sup>a</sup>	3.8203	3.8203	9,568	0.0716
7007	Top	67	36 <sup>a</sup>	7.9420	7.9420	18,228	0.0656
7008	Top	78	36 <sup>a</sup>	15.4730	15.4730	40,762	0.0753
7009	Top	92	7 <sup>b</sup>	109.9172	11.5572	45,945	0.114
7010	Top	160	6.8 <sup>b</sup>	137.5935	24.3535	79,060	0.0928
7011	Top	335			8.6640	13,639	0.0450

a Surface area harvested in square inches

b Surface area harvested in square feet

Table D-44

## PLANT UPTAKE SUMMARY: CLOVER

Soil: LOAM

Container Number: 72

Radionuclide: CS-137

Date Planted: July 15, 1965

Initial Soil Activity (c/m/gm): 33,690

Date Emerged: July 22, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
7203	Top	67	2 <sup>a</sup>	0.9553	0.9553	1,010	0.0314
7204	Top	78	2 <sup>a</sup>	1.1399	1.1399	1,039	0.0271
7205	Top	106	2 <sup>b</sup>	22.6425	8.5325	8,124	0.0283
7206	Top	160	1 <sup>b</sup>	75.7565	23.2765	35,430	0.0452
7207	Top	335			8.1320	735	0.00268

a Surface area harvested in square inches

b Surface area harvested in square feet

Table D-45

## PLANT UPTAKE SUMMARY: CLOVER

Soil: CLAY

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 35,210

Container Number: 71

Date Planted: July 15, 1965

Date Emerged: July 23, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
7103	Top	67	4 <sup>a</sup>	0.9369	0.9369	1,378	0.0418
7104	Top	78	4 <sup>a</sup>	1.0226	1.0226	1,756	0.0488
7105	Top	106	1 <sup>b</sup>	7.4225	7.4225	17,733	0.0678
7106	Top	160	4 <sup>b</sup>	31.1740	16.5740	28,097	0.0481
7107	Top	335			8.5475	2,563	0.00853

a Surface area harvested in square inches

b Surface area harvested in square feet

Table D-46

## PLANT UPTAKE SUMMARY: CLOVER

Soil: SAND

Radionuclide: RU-106

Initial Soil Activity (c/m/gm): 6,855

Container Number: 16

Date Planted: July 8, 1965

Date Emerged: July 16, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
1603	Whole	36	6	0.8175	0.8175	7,174	1.28
1604	Top	47	4 <sup>a</sup>	1.1433	1.1433	4,430	0.565
1605	Top	54	8 <sup>a</sup>	3.1037	3.1037	11,119	0.522
1606	Top	61	16 <sup>a</sup>	4.2586	4.2586	8,769	0.300
1607	Top	70	36 <sup>a</sup>	7.2318	7.2318	8,142	0.164
1608	Top	81	36 <sup>a</sup>	6.4618	6.4618	6,145	0.139
1609	Top	95	8 <sup>b</sup>	94.9832	9.3232	17,477	0.274
1610	Top	167	7.2 <sup>b</sup>	131.2620	19.1620	4,732	0.0360
1611	Top	342			9.8142	5,563	0.0812

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a Surface area harvested in square inches

b Surface area harvested in square feet

Table D-47

## PLANT UPTAKE SUMMARY: CLOVER

Soil: LOAM

Radionuclide: RU-106

Initial Soil Activity (c/m/gm): 7,069

Container Number: 15

Date Planted: July 8, 1965

Date Emerged: July 23, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
1503	Whole	36	5	0.0897	0.0897	250	0.394
1504	Whole	47	3	0.1135	0.1135	181	0.226
1505	Top	54	4 <sup>a</sup>	0.2488	0.2488	352	0.200
1506	Top	70	4 <sup>a</sup>	1.7990	1.7990	1,107	0.0870
1507	Top	81	6 <sup>a</sup>	3.4813	3.4813	1,457	0.0592
1508	Top	95	2.25 <sup>b</sup>	20.4396	9.9996	3,772	0.0534
1509	Top	167	6.5 <sup>b</sup>	107.9454	16.7454	3,995	0.0338
1510	Top	342			13.0525	745	0.00808

a Surface area harvested in square inches

b Surface area harvested in square feet

Table D-48

## PLANT UPTAKE SUMMARY: CLOVER

Soil: SAND

Radionuclide: ZR-NB-95

Initial Soil Activity (c/m/gm): 73.720

Container Number: 69

Date Planted: July 15, 1965

Date Emerged: July 21, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
6903	Whole	29	9	0.3547	0.3547	1,850	0.0708
6904	Whole	40	4	0.5635	0.5635	3,953	0.0952
6905	Whole	48	4	0.6437	0.6437	1,847	0.0389
6906	Top	54	6 <sup>a</sup>	3.5980	3.5980	5,964	0.0225
6907	Top	63	16 <sup>a</sup>	4.6083	4.6083	6,503	0.0191
6908	Top	75	36 <sup>a</sup>	8.4035	8.4035	7,106	0.0115
6909	Top	85	24 <sup>a</sup>	8.0703	8.0703	18,254	0.0307
6910	Top	92	8 <sup>b</sup>	55.1213	9.0913	36,617	0.0546
6911	Top	160	1 <sup>b</sup>	15.9620	15.9620	140,358	0.116
6912	Top	335			6.4670	13,654	0.0286

a Surface area harvested in square inches

b Surface area harvested in square feet

Table D-49

## PLANT UPTAKE SUMMARY: CLOVER

Soil: LOAM	Container Number: 68
Radionuclide: ZR-NB-95	Date Planted: July 15, 1965
Initial Soil Activity (c/m/gm): 75,470	Date Emerged: Aug. 9, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
6804	Top	106	1 <sup>a</sup>	6.9411	6.9411	32,729	0.0625
6805	Top	160	6.5 <sup>a</sup>	145.6485	16.0985	52,359	0.0441

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<sup>a</sup> Surface area harvested in square feet



Table D-50

## PLANT UPTAKE SUMMARY: CLOVER

Soil: SAND

Radionuclide: CE-144

Initial Soil Activity (c/m/gm): 7,702

Container Number: 2

Date Planted: July 8, 1965

Date Emerged: July 15, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
203	Whole	27	10	0.3184	0.3184	2,441	0.995
204	Whole	36	8 <sup>a</sup>	0.6754	0.6754	4,247	0.816
205	Top	46	8 <sup>a</sup>	2.9913	2.9913	5,116	0.222
206	Top	54	8 <sup>a</sup>	3.3317	3.3317	2,401	0.0936
207	Top	61	16 <sup>a</sup>	3.7272	3.7272	1,966	0.0685
208	Top	70	36 <sup>a</sup>	10.5575	10.5575	3,770	0.0464
209	Top	81	36 <sup>a</sup>	10.7770	10.7770	4,731	0.0570
210	Top	95	8 <sup>b</sup>	164.7282	15.6882	8,093	0.0670
211	Top	167	7.2 <sup>b</sup>	141.0032	18.3032	11,907	0.0845
212	Top	342			7.8908	2,855	0.0470

a Surface area harvested in square inches

b Surface area harvested in square feet

Table D-51

## PLANT UPTAKE SUMMARY: CLOVER

Soil: LOAM  
 Radionuclide: CE-144  
 Initial Soil Activity (c/m/gm): 7,981

Container Number: 3  
 Date Planted: July 8, 1965  
 Date Emerged: July 22, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup> SU</u>
303	Whole	46	4	0.4469	0.4469	210	0.0589
304	Whole	54	2	0.2352	0.2352	147	0.0783
305	Top	70	4 <sup>a</sup>	1.7492	1.7492	587	0.0420
306	Top	81	6 <sup>a</sup>	3.0105	3.0105	1,897	0.0790
307	Top	95	2.25 <sup>b</sup>	18.2820	8.8420	2,681	0.0380
308	Top	167	--	--	9.4156	3,737	0.0497
309	Top	342	--	--	6.6000	2,903	0.0551

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a Surface area harvested in square inches

b Surface area harvested in square feet

Table D-52

## PLANT UPTAKE SUMMARY: CLOVER

Soil: CLAY

Radionuclide: CE-144

Initial Soil Activity (c/m/gm): 7,626

Container Number: 1

Date Planted: July 8, 1965

Date Emerged: July 16, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
103	Whole	36	12	0.2000	0.2000	472	0.310
105	Whole	54	5	0.3103	0.3103	417	0.176
104	Top	46	2 <sup>a</sup>	0.4592	0.2296	585	0.334
106	Top	61	4 <sup>a</sup>	0.9915	0.9915	758	0.100
107	Top	70	8 <sup>a</sup>	2.3282	2.3282	736	0.0414
108	Top	81	12 <sup>a</sup>	3.0055	3.0055	1,288	0.0562
109	Top	95	4 <sup>b</sup>	25.8084	10.2834	5,355	0.0683
110	Top	167	7.2 <sup>b</sup>	77.4185	14.4185	5,208	0.0474
111	Top	342			5.8170	596	0.0134

---

a Surface area harvested in square inches

b Surface area harvested in square feet

Table D-53

## PLANT UPTAKE SUMMARY: CLOVER

Soil: SAND

Radionuclide: Control

Initial Soil Activity (c/m/gm): --

Container Number: 10

Date Planted: July 8, 1965

Date Emerged: July 16, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
1001	Whole	24	10	0.1913	0.1913	30	
1002	Whole	34	4 <sup>a</sup>	0.1875	0.1875	0	
1003	Top	55	4 <sup>a</sup>	1.0240	1.0240	0	
1004	Top	67	12 <sup>a</sup>	2.7275	2.7275	23	
1005	Top	80	4 <sup>b</sup>	44.3660	9.9260	215	
1006	Top	152	6 <sup>b</sup>	175.7880	11.7380	276	

a Surface area harvested in square inches

b Surface area harvested in square feet

Table D-54

## PLANT UPTAKE SUMMARY: CLOVER

Soil: CLAY

Radionuclide: Control

Initial Soil Activity (c/m/gm): --

Container Number: 32

Date Planted: July 8, 1965

Date Emerged: July 16, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
3201	Whole	39	15	0.2217	0.2217	13	
3202	Whole	49	10	0.4525	0.4525	15	
3203	Top	56	6 <sup>a</sup>	2.2915	2.2915	24	
3204	Top	70	16 <sup>a</sup>	2.0237	2.0237	0	
3205	Top	82	36 <sup>a</sup>	6.0977	6.0977	130	
3206	Top	95	8 <sup>b</sup>	47.8891	11.6091	146	
3207	Top	167	7.3 <sup>b</sup>	104.3134	9.4134	1,275	

a Surface area harvested in square inches

b Surface area harvested in square feet

Table D-55

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: SAND

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 8,206

Container Number: 91

Date Planted: July 23, 1965

Date Emerged: July 29, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
9103	Shoot	27	20	0.6682	0.6682	36,323	6.62
9104	Shoot	35	20	1.2730	1.2730	67,694	6.48
9106	Shoot	35	20	1.4894	1.4894	57,514	4.71
9105	Leaves	35	20	1.1807	1.1807	55,135	5.69
9107	Leaves	42	10	2.4715	2.4715	108,722	5.36
9108	Leaves	47	20	6.8917	6.8917	329,384	5.82
9109	Leaves	47	20	5.9203	5.9203	215,058	4.43
9111	Leaves	53	10	4.6994	4.6994	159,351	4.13
9112	Leaves	53	10	6.2196	6.2196	216,020	4.23
9115	Leaves	63	10	6.9920	6.9920	237,535	4.14
9116	Leaves	63	10	7.1610	7.1610	168,963	2.88
9118	Leaves	74	8	4.6960	4.6960	182,185	4.73
9121	Leaves	91	2	3.5562	3.5562	74,346	2.55
9122	Leaves	104	2	4.0690	4.0690	128,920	3.86
9123	Leaves	116	3	12.6215	12.6215	471,011	4.55
9127	Leaves	138	5	22.5643	11.5795	403,883	4.25
9119	Head	81	4	5.9068	5.9068	145,422	3.00
9124	Head	116	3	9.4170	9.4170	109,071	1.41
9126	Head	138	5	21.0450	21.0450	306,098	1.77
9110	Root	47	20	0.5244	0.5244	18,227	4.24
9117	Root	47	10	0.1942	0.1942	9,918	6.22
9113	Root	53	10	0.2654	0.2654	8,852	4.09
9120	Root	81	4	0.9025	0.9025	20,546	2.77
9125	Root	116	3	5.9892	5.9892	156,388	3.18
9128	Root	138	5	15.1377	15.1377	245,122	1.97

Table D-56

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: LOAM

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 6,425

Container Number: 106

Date Planted: Aug. 17, 1965

Date Emerged: Sept. 7, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
10603	Shoot	38	10	0.3211	0.3211	5,410	2.62
10604	Leaves	49	14	1.1589	1.1589	18,980	2.55
10605	Leaves	56	22	4.6093	4.6093	61,645	2.08
10606	Leaves	66	6	6.2465	6.2465	66,029	1.65
10607	Leaves	79	5	19.0446	19.0446	99,891	0.816
10608	Leaves	91	1	13.2712	13.2712	109,890	1.29
10612	Leaves	113	4	44.4766	13.2958	131,517	1.54
10609	Head	91	1	11.8715	11.8715	28,691	0.376
10611	Head	113	4	25.1345	25.1345	67,547	0.418
10610	Root	91	1	3.4050	3.4050	17,393	0.795
10613	Root	113	4	8.6059	8.6059	42,128	0.762

Table D-57

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: LOAM

Container Number: 107

Radionuclide: SR-85

Date Planted: Aug. 17, 1965

Initial Soil Activity (c/m/gm): 6,260

Date Emerged: Sept. 7, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>85</sup>Sr</u>
10703	Shoot	38	10	0.1973	0.1973	3,573	2.89
10704	Leaves	48	15	1.3393	1.3393	28,394	3.39
10705	Leaves	58	18	4.7572	4.7572	45,620	1.53
10706	Leaves	68	6	3.3971	3.3971	28,202	1.33
10707	Leaves	79	5	8.1149	8.1149	68,705	1.35
10708	Leaves	91	2	16.1697	16.1697	91,975	0.909
10712	Leaves	113	4	32.6155	10.6050	102,329	1.54
10709	Head	91	2	11.9235	11.9235	16,736	0.224
10711	Head	113	4	20.5545	10.6569	36,672	0.550
10710	Root	91	2	5.9746	5.9746	11,583	0.310
10713	Root	113	4	7.5197	7.5197	36,848	0.783



Table D-58

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: LOAM  
 Radionuclide: SR-85  
 Initial Soil Activity (c/m/gm): 6,344

Container Number: 108  
 Date Planted: Aug. 17, 1965  
 Date Emerged: Sept. 7, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>45</sup>SU</u>
10803	Shoot	38	10	0.4860	0.4860	7,813	2.53
10804	Leaves	49	10	0.3317	0.3317	10,137	4.82
10805	Leaves	56	2	0.9495	0.9495	15,123	2.51
10806	Leaves	66	4	3.2970	3.2970	28,274	1.35
10807	Leaves	79	7	7.0134	7.0134	94,825	2.13
10808	Leaves	91	2	6.0911	6.0911	36,914	0.955
10811	Leaves	113	5	33.0190	11.8445	104,466	1.39
10810	Head	113	5	24.7368	14.1805	35,723	0.397
10809	Root	91	2	0.8038	0.8038	4,307	0.845
10812	Root	113	5	8.5515	8.5515	35,268	0.650

Table D-59

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: LOAM  
 Radionuclide: SR-85  
 Initial Soil Activity (c/m/gm): 6,260

Container Number: 109  
 Date Planted: Aug. 17, 1965  
 Date Emerged: Aug. 26, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
10903	Shoot	38	10	0.2464	0.2464	4,404	2.86
10904	Leaves	48	9	0.5130	0.5130	11,103	3.46
10905	Leaves	56	7	3.7865	3.7865	51,734	2.18
10906	Leaves	66	5	1.4235	1.4235	18,755	2.10
10907	Leaves	79	10	8.8299	8.8299	105,021	1.90
10908	Leaves	91	1	21.1769	21.1769	194,294	1.47
10912	Leaves	113	5	28.2775	7.0730	68,213	1.54
10909	Head	91	1	15.8135	15.8135	27,979	0.283
10911	Head	113	5	21.1210	10.9160	40,703	0.596
10910	Root	91	1	5.4875	5.4875	21,398	0.623
10913	Root	113	5	9.0865	9.0865	37,179	0.654

Table D-60

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: LOAM

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 6,409

Container Number: 110

Date Planted: Aug. 17, 1965

Date Emerged: Sept. 7, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
11003	Shoot	38	10	0.2852	0.2852	4,893	2.68
11004	Leaves	49	11	0.9210	0.9210	19,291	3.27
11005	Leaves	56	15	4.4310	4.4310	59,529	2.10
11006	Leaves	66	3	5.1390	5.1390	40,492	1.23
11007	Leaves	79	5	14.3406	14.3406	130,481	1.42
11008	Leaves	91	5	18.2605	18.2605	138,976	1.19
11011	Leaves	113	5	48.4675	15.4585	133,455	1.35
11010	Head	113	5	24.6885	24.6885	77,757	0.492
11009	Root	91	5	2.5492	2.5492	15,114	0.925
11012	Root	113	5	11.7890	11.7890	52,973	0.701

Table D-61

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: CLAY

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 8,206

Container Number: 90

Date Planted: July 23, 1965

Date Emerged: July 31, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
9003	Shoot	35	30	0.3484	0.3484	4,528	1.58
9004	Shoot	42	50	1.0145	1.0145	12,750	1.53
9005	Leaves	53	20	1.2403	1.2403	13,542	1.33
9006	Leaves	63	10	3.9714	3.9714	40,458	1.24
9007	Leaves	63	10	2.0197	2.0197	16,184	0.976
9008	Leaves	74	11	3.0720	3.0720	32,110	1.27
9009	Leaves	81	11	5.5614	5.5614	32,057	0.702
9010	Leaves	81	14	5.8312	5.8312	28,851	0.603
9012	Leaves	91	2	1.5517	1.5517	3,197	0.251
9013	Leaves	104	5	3.3203	3.3203	12,786	0.469
9014	Leaves	116	2	7.0560	7.0560	64,351	1.11
9018	Leaves	138	4	20.0307	9.8132	38,954	0.484
9015	Head	116	2	12.8219	12.8219	27,840	0.265
9017	Head	138	2	7.2885	7.2885	17,389	0.291
9011	Root	81	25	1.6880	1.6880	10,089	0.728
9016	Root	116	2	3.2029	3.2029	24,100	0.917
9019	Root	138	4	8.6466	8.6466	24,892	0.351

Table D-62

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: SAND

Container Number: 74

Radionuclide: CS-137

Date Planted: July 15, 1965

Initial Soil Activity (c/m/gm): 34,640

Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>137</sup> SU
7403	Leaves	25	40	1.9839	1.9839	51,501	0.749
7404	Leaves	29	10	0.9967	0.9967	29,883	0.866
7405	Leaves	41	20	5.5787	5.5787	125,459	0.648
7406	Leaves	41		5.0405	5.0405	83,749	0.480
7407	Leaves	48	3	7.1498	7.1498	174,383	0.704
7408	Leaves	48	3	5.7089	5.7089	126,663	0.640
7409	Leaves	55	2	5.8200	5.8200	91,997	0.456
7410	Leaves	55	2	5.8122	5.8122	141,664	0.704
7411	Leaves	67	1	7.5506	7.5506	143,269	0.548
7412	Leaves	78	1	4.5625	4.5625	105,339	0.666
7416	Leaves	106	3	7.0781	7.0781	157,050	0.640
7418	Leaves	123	3	6.7593	6.7593	156,462	0.668
7413	Head	85	2	11.1028	11.1028	212,315	0.552
7414	Head	92	2	4.0332	4.0332	54,314	0.389
7415	Head	106	3	11.0149	11.0149	102,905	0.270
7419	Head	123	3	4.3036	4.3036	48,357	0.324
7421	Whole	141	2	16.5641	16.5641	309,325	0.539
7417	Root	106	3	5.5365	5.5365	62,209	0.324
7420	Root	123	3	7.3223	7.3223	61,100	0.241
7422	Root	141	2	5.3345	5.3345	57,711	0.312

Table D-63

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: LOAM

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 33,870  
33,810

Container Number: 73

Date Planted: July 15, 1965  
Aug. 17, 1965Date Emerged: Aug. 3, 1965  
Aug. 30, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>137</sup> SU
7303	Leaves	52	2	2.5461	2.5461	2,034	0.0236
7304	Leaves	59	2	0.4663	0.4663	392	0.0248
7305	Leaves	73	2	2.6990	2.6990	2,396	0.0300
7306	Leaves	90	7	14.1998	14.1998	18,598	0.0388
7308	Leaves	109	4	37.0640	15.3445	11,695	0.0225
7309	Head	109	4	18.3352	18.3352	7,867	0.0127
7307	Root	90	7	1.5455	1.5455	1,349	0.0258
7310	Root	109	4	12.0670	12.0670	3,697	0.00906

Table D-64

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: CLAY

Container Number: 75

Radionuclide: CS-137

Date Planted: July 15, 1965

Initial Soil Activity (c/m/gm): 33,950

Date Emerged: July 25, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
7503	Leaves	67	5	1.8006	1.8006	6,149	0.101
7504	Leaves	78	1	1.4070	1.4070	5,031	0.105
7505	Leaves	85	6	3.5095	3.5095	17,119	0.144
7507	Leaves	92	4	4.5578	4.5578	14,427	0.0932
7508	Leaves	106	4	10.0813	10.0813	25,798	0.0754
7509	Leaves	123	1	8.1128	8.1128	33,318	0.121
7512	Leaves	141	3	16.6898	11.4700	67,718	0.174
7510	Head	123	1	2.8671	2.8671	8,087	0.0831
7513	Head	141	3	8.8180	8.8180	32,264	0.108
7506	Root	85	6	0.7125	0.7125	2,207	0.0912
7511	Root	123	1	4.0792	4.0792	12,771	0.0922
7514	Root	141	3	9.8187	9.8187	29,441	0.0883

Table D-65

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: SAND

Radionuclide: RU-106

Initial Soil Activity (c/m/gm): 6,855

Container Number: 38

Date Planted: July 8, 1965

Date Emerged: July 15, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
3803	Shoot	27	10	0.6552	0.6552	2,781	0.619
3804	Leaves	32	30	5.8394	5.8394	14,827	0.370
3805	Leaves	36	5	0.9896	0.9896	1,938	0.286
3806	Leaves	47	4	7.2173	7.2173	5,032	0.102
3807	Leaves	54	4	8.9295	8.9295	5,693	0.0930
3808	Leaves	54	4	8.4492	8.4492	4,222	0.0729
3809	Leaves	61	2	4.6473	4.6473	2,085	0.0654
3810	Leaves	70	3	10.1600	10.1600	7,394	0.106
3811	Leaves	70	3	8.3309	8.3309	4,868	0.0852
3812	Leaves	81	3	8.8390	8.8390	2,460	0.0406
3817	Leaves	113	4	12.1275	12.1275	19,955	0.240
3819	Leaves	130	3	10.4722	10.4722	16,223	0.226
3813	Head	90	3	8.8733	8.8733	2,544	0.0418
3814	Head	99	1	7.7920	7.7920	2,224	0.0416
3816	Head	113	4	27.1943	27.1943	4,935	0.0265
3820	Head	130	3	9.7025	9.7025	2,823	0.0424
3815	Root	99	1	1.7376	1.7376	7,739	0.649
3818	Root	113	4	9.9786	9.9786	53,374	0.780
3821	Root	130	3	15.4637	15.4637	47,450	0.448



Table D-66

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: LOAM

Radionuclide: RU-106

Initial Soil Activity (c/m/gm): 6,925  
6,418

Container Number: 39

Date Planted: July 8, 1965  
Aug. 16, 1965Date Emerged: July 16, 1965  
Aug. 25, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
3903	Leaves	39	3	1.7437	1.7437	1,110	0.0919
3904	Leaves	91	1	6.3435	6.3435	1,645	0.0404
3907	Leaves	109	2	11.1245	11.1245	3,936	0.0551
3905	Head	91	1	4.3604	4.3604	355	0.0127
3908	Head	109	2	6.4658	6.4658	780	0.0188
3906	Root	91	1	3.2474	3.2474	1,240	0.0595
3909	Root	109	2	4.5371	4.5371	1,125	0.0386

Table D-67

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: SAND

Radionuclide: ZR-NB-95

Initial Soil Activity (c/m/gm): 73,980

Container Number: 66

Date Planted: July 15, 1965

Date Emerged: July 21, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Container Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
6603	Leaves	29	15	1.1264	1.1264	6,820	0.0819
6604	Leaves	40	12	9.5936	9.5936	22,597	0.0318
6605	Leaves	48	5	4.6115	4.6115	6,546	0.0192
6606	Leaves	48	5	6.6933	6.6933	13,453	0.0272
6607	Leaves	54	8	10.0755	10.0755	16,262	0.0218
6608	Leaves	55	5	5.3355	5.3355	13,444	0.0341
6609	Leaves	55	5	5.5370	5.5370	13,375	0.0327
6610	Leaves	63	1	4.4558	4.4558	25,606	0.0777
6611	Leaves	75	1	6.3425	6.3425	15,291	0.0326
6612	Leaves	75	1	3.9594	3.9594	5,903	0.0202
6616	Leaves	106	2	8.8010	8.8010	49,626	0.0762
6618	Leaves	123	4	16.6826	16.6826	81,299	0.0659
6621	Leaves	141	5	30.6835	15.2815	65,370	0.0578
6613	Head	85	2	6.4961	6.4961	24,646	0.0513
6614	Head	92	3	7.6791	7.6791	40,356	0.0710
6615	Head	106	2	10.9910	10.9910	5,830	0.00717
6619	Head	123	4	17.8223	17.8223	8,830	0.00670
6622	Head	141	5	31.6323	17.1819	13,420	0.0106
6617	Root	106	2	3.7220	3.7220	23,528	0.0855
6620	Root	123	4	17.4790	17.4790	129,442	0.100
6623	Root	141	5	21.0546	21.0546	239,019	0.154

Table D-68

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: LOAM	Container Number: 67
Radionuclide: ZR-NB-95	Date Planted: July 15, 1965;
Initial Soil Activity (c/m/gm): 74,480;	Aug. 16, 1965
47,549	Date Emerged: July 30, 1965;
	Aug. 25, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
6703	Shoot	43	15	0.3017	0.3017	791	0.0540
6704	Leaves	53	5	1.6724	1.6724	2,875	0.0354
6705	Leaves	60	20	2.9427	2.9427	6,808	0.0477
6706	Leaves	74	5	4.4335	4.4335	3,720	0.0173
6707	Leaves	91	1	15.0340	15.0340	20,214	0.0277
6710	Leaves	109	3	26.7153	13.9614	28,315	0.0418
6708	Head	91	1	9.2474	9.2474	1,040	0.00232
6711	Head	109	3	13.4692	13.4692	3,335	0.00521
6709	Root	91	1	4.4708	4.4708	9,212	0.0424
6712	Root	109	3	7.3363	7.3363	13,141	0.0369

Table D-69

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: SAND

Radionuclide: CE-144

Initial Soil Activity (c/m/gm): 7,702

Container Number: 24

Date Planted: July 8, 1965

Date Emerged: July 15, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
2403	Shoot	27	5	0.2266	0.2266	779	0.0453
2404	Leaves	32	30	4.5051	4.5051	8,322	0.240
2405	Leaves	36	10	1.5501	1.5501	3,177	0.266
2406	Leaves	46	4	4.2835	4.2835	3,175	0.0962
2407	Leaves	54	9	5.7142	5.7142	3,774	0.0858
2408	Leaves	54	9	8.2184	8.2184	6,497	0.103
2409	Leaves	61	7	10.7533	10.7533	5,886	0.0711
2410	Leaves	62	3	5.2575	5.2575	2,657	0.0656
2411	Leaves	62	3	5.0648	5.0648	2,113	0.0542
2412	Leaves	70	4	9.4687	9.4687	5,125	0.0703
2413	Leaves	70	4	4.9695	4.9695	3,026	0.0791
2414	Leaves	81	2	9.8591	9.8591	6,320	0.0832
2417	Leaves	130	3	8.5691	8.5691	12,789	0.194
2420	Leaves	148	2	7.7198	7.7198	18,618	0.313
2415	Head	90	2	5.9255	5.9255	3,631	0.0796
2416	Head	113	1	3.9309	3.9309	3,770	0.124
2418	Head	130	3	10.5557	10.5557	3,856	0.0474
2419	Root	130	3	7.7527	7.7525	9,694	0.162
2421	Root	148	2	2.8672	2.8672	5,789	0.262

Table D-70

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: LOAM

Radionuclide: CE-144

Initial Soil Activity (c/m/gm): 7,515  
6,718

Container Number: 25

Date Planted: July 8, 1965

Aug. 16, 1965

Date Emerged: July 16, 1965

Aug. 25, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u>a<sub>SU</sub></u>
2504	Leaves	31	2	0.2212	0.2212	84	0.0565
2503	Leaves	39	3	3.0077	3.0077	1,358	0.0601
2506	Leaves	51	14	0.9970	0.9970	262	0.0392
2507	Leaves	60	20	2.9572	2.9572	858	0.0432
2508	Leaves	74	6	9.0112	9.0112	1,837	0.0304
2509	Leaves	91	3	13.6941	13.6941	4,675	0.0508
2511	Leaves	109	4	36.1985	8.7480	5,769	0.0982
2512	Head	109	2	9.8707	9.8707	1,257	0.0190
2510	Root	91	3	2.2915	2.2915	3,246	0.211
2513	Root	109	4	7.1400	7.1400	2,644	0.0551

Table D-71

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: CLAY

Radionuclide: CE-144

Initial Soil Activity (c/m/gm): 7,291

Container Number: 27

Date Planted: July 8, 1965

Date Emerged: July 16, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup> SU</u>
2303	Leaves	54	2	0.4071	0.4071	210	0.0708
2304	Leaves	70	3	5.7190	5.7190	1,762	0.0423
2305	Leaves	81	4	7.2386	7.2386	1,529	0.0290
2307	Leaves	91	4	3.9142	6.4948	1,349	0.0174
2310	Leaves	130	2	13.3799	13.3799	11,035	0.113
2313	Leaves	148	5	16.6912	8.4942	15,535	0.251
2306	Head	90	2	6.4948	6.4948	1,349	0.0285
2308	Head	99	2	8.7200	8.7200	1,710	0.0269
2309	Head	113	2	6.0143	6.0143	1,003	0.0229
2311	Head	130	2	17.5884	17.5884	1,061	0.00827
2314	Head	148	5	21.8013	9.5380	2,316	0.0333
2312	Root	130	2	8.9083	8.9083	4,401	0.0678
2315	Root	148	4	10.8435	10.8435	6,707	0.0848

Table D-72

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: SAND  
 Radionuclide: Control  
 Initial Soil Activity (c/m/gm): -

Container Number: 22  
 Date Planted: July 8, 1965  
 Date Emerged: July 15, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup> SU</u>
2201	Shoot	27	10	0.3258	0.3257	27	
2202	Leaves	32	20	2.7772	2.7772	239	
2203	Leaves	39	4	1.0012	1.0012	52	
2204	Leaves	49	4	4.2888	4.2888	65	
2205	Leaves	56	8	5.0313	5.0313	114	
2206	Leaves	70	2	5.8926	5.8926	28	
2207	Leaves	70	2	7.1853	7.1853	142	
2208	Leaves	82	2	5.1945	5.1945	285	
2211	Leaves	99	1	9.6760	9.6760	17	
2213	Leaves	113	2	8.9601	8.9601	75	
2209	Head	99	1	17.1650	17.1650	144	
2212	Head	113	2	8.0572	8.0572	3	
2210	Root	99	1	10.4180	10.4180	66	
2214	Root	113	2	5.4219	5.4219	0	

Table D-73

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: LOAM  
 Radionuclide: Control  
 Initial Soil Activity (c/m<sup>2</sup>/gm): -

Container Number: 21  
 Date Planted: July 15, 1965  
 Aug. 17, 1965  
 Date Emerged: July 23, 1965  
 Sept. 7, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>65</sup> SU
2101	Leaves	32	5	1.2527	1.2527	33	
2102	Leaves	59	10	1.9975	1.9975	16	
2104	Leaves	73	5	4.9295	4.9295	37	
2105	Leaves	108	2	16.3057	16.3057	207	
2106	Head	108	2	5.5972	5.5972	21	
2107	Root	108	2	3.7900	3.7900	6	



Table D-74

## PLANT UPTAKE SUMMARY: LETTUCE

Soil: CLAY  
 Radionuclide: Control  
 Initial Soil Activity (c/m/gm): -

Container Number: 42  
 Date Planted: July 8, 1965  
 Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
4201	Leaves	70	4	1.7325	1.7325	3	
4202	Leaves	82	2	1.1987	1.1987	40	
4203	Leaves	99	5	2.6227	2.6227	28	
4205	Leaves	113	2	3.7354	3.7354	50	
4204	Head	113	2	4.9727	4.9727	23	
4206	Whole	148	2	12.1940	12.1940	249	
4207	Root	148	2	3.3730	3.3730	64	

Table D-75

## PLANT UPTAKE SUMMARY: RADISHES

Soil: SAND  
 Radionuclide: SR-85  
 Initial Soil Activity (c/m/gm): 8,439

Container Number: 92  
 Date Planted: July 23, 1965  
 Date Emerged: July 31, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
9203	Top	27	5	2.4310	2.4310	380,004	18.5
9205	Top	35	1	0.2876	0.2876	30,443	12.6
9204	Root	27	5	2.7151	2.7151	58,777	2.57
9206	Root	35	1	0.2225	0.2225	7,131	3.80

Table D-76

## PLANT UPTAKE SUMMARY: RADISHES

Soil: LOAM  
 Radionuclide: SR-85  
 Initial Soil Activity (c/m/gm): 8,457

Container Number: 93  
 Date Planted: July 23, 1965  
 Date Emerged: August 3, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
9303	Top	27	3	1.4572	1.4572	97,453	7.91
9305	Top	35	2	0.5833	0.5833	37,201	7.54
9304	Root	27	3	1.9072	1.9072	23,493	1.46
9306	Root	35	2	0.8887	0.8887	9,522	1.27

Table D-77

## PLANT UPTAKE SUMMARY: RADISHES

Soil: LOAM  
 Radionuclide: SR-85  
 Initial Soil Activity (c/m/gm): 8,457

Container Number: 94  
 Date Planted: July 23, 1965  
 Date Emerged: August 3, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
9403	Top	24	10	4.7335	4.7335	225,827	5.64
9405	Top	35	7	5.5306	5.5306	247,548	5.29
9404	Root	24	10	5.0036	5.0036	35,088	0.829
9406	Root	35	7	5.0102	5.0102	37,429	0.883

Table D-78

## PLANT UPTAKE SUMMARY: RADIIUM

Soil: LOAM

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 8,198

Container Number: 111

Date Planted: July 23, 1965

Date Emerged: August 8, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
11103	Top	27	5	2.3698	2.3698	141,355	7.28
11105	Top	35	4	0.5505	0.5505	27,957	6.19
11104	Root	27	5	2.8506	2.8506	21,934	0.939
11106	Root	35	4	0.0699	0.0699	1,025	1.79

Table D-79

## PLANT UPTAKE SUMMARY: RADISHES

Soil: LOAM

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 8,589

Container Number: 112

Date Planted: July 23, 1965

Date Emerged: August 9, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
11203	Top	27	4	1.7408	1.7408	77,009	5.15
11205	Top	35	3	0.6834	0.6834	43,699	7.44
11204	Root	27	4	1.5371	1.5371	6,611	0.770
11206	Root	35	3	0.7212	0.7212	6,351	1.03

Table D-80

## PLANT UPTAKE SUMMARY: RADISHES

Soil: LOAM  
 Radionuclide: SR-85  
 Initial Soil Activity (c/m/gm): 8,548

Container Number: 113  
 Date Planted: July 23, 1965  
 Date Emerged: Aug. 10, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
11303	Top	27	3	1.8522	1.8522	116,077	7.33
11305	Top	35	3	0.5370	0.5370	33,360	7.27
11304	Root	27	3	2.2851	2.2851	19,027	0.974
11306	Root	35	3	0.1934	0.1934	15,186	1.78

Table D-81

## PLANT UPTAKE SUMMARY: RADISHES

Soil: CLAY  
 Radionuclide: SR-85  
 Initial Soil Activity (c/m/gm): 8,288

Container Number: 95  
 Date Planted: July 23, 1965  
 Date Emerged: July 31, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
9503	Top	24	10	2.3670	2.3670	118,372	6.03
9505	Top	35	14	3.1825	3.1825	150,471	5.70
9504	Root	24	10	2.6975	2.6975	20,501	0.917
9506	Root	35	14	6.6728	6.6728	45,017	0.814

Table D-82

## PLANT UPTAKE SUMMARY: RADISHES

Soil: SAND

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 33,350

Container Number: 77

Date Planted: July 15, 1965

Date Emerged: July 22, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
7703	Top	22	14	4.9752	4.9752	14,198	0.0856
7705	Top	25	15	7.8599	7.8599	31,402	0.120
7704	Root	22	14	4.0880	4.0880	6,758	0.0496
7706	Root	25	15	5.1637	5.1637	5,370	0.0312

Table D-83

## PLANT UPTAKE SUMMARY: RADISHES

Soil: LOAM

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 34,990  
34,820

Container Number: 78

Date Planted: July 15, 1965  
Aug. 17, 1965Date Emerged: July 30, 1965  
Aug. 30, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number Of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
7803	Top	29	4	1.3537	1.3537	1,465	0.0309
7805	Top	32	3	0.8139	0.8139	1,144	0.0402
7807	Top	34	9	4.4891	4.4891	10,165	0.0650
7804	Root	29	4	0.8906	0.8906	359	0.0115
7806	Root	32	3	0.3434	0.3434	78	0.00649
7808	Root	34	9	7.9144	7.9144	1,160	0.00420

Table D-84

## PLANT UPTAKE SUMMARY: RADISHES

Soil: LOAM

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 33,870  
33,810

Container Number: 79

Date Planted: July 15, 1965

Aug. 17, 1965

Date Emerged: Aug. 26, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
7903	Top	29	6	1.5625	1.5625	2,438	0.0446
7905	Top	32	5	1.9182	1.9182	3,081	0.0459
7907	Top	34	7	2.7020	2.7020	5,201	0.0569
7904	Root	29	6	0.5969	0.5969	183	0.00876
7906	Root	32	5	1.0007	1.0007	324	0.00925
7908	Root	34	7	1.7817	1.7817	296	0.00491

Table D-85

## PLANT UPTAKE SUMMARY: RADISHES

Soil: LOAM

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 33,870  
33,810

Container Number: 80

Date Planted: July 15, 1965

Aug. 17, 1965

Date Emerged: Aug. 26, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
8003	Top	22	2	0.6326	0.6326	1,603	0.0724
8005	Top	29	4	1.3741	1.3741	2,758	0.0574
8007	Top	32	3	0.8372	0.8372	592	0.0202
8009	Top	34	7	2.2396	2.2396	3,698	0.0488
8004	Root	22	2	0.5042	0.5042	211	0.0120
8006	Root	29	4	0.9539	0.9539	230	0.00689
8008	Root	32	3	0.6404	0.6404	84	0.00375
8010	Root	34	7	4.0398	4.0398	537	0.00393

Table D-86

## PLANT UPTAKE SUMMARY: RADISHES

Soil: LOAM  
 Radionuclide: CS-137  
 Initial Soil Activity (c/m/gm): 34,460  
 34,290

Container Number: 81  
 Date Planted: July 15, 1965  
 Aug. 17, 1965  
 Date Emerged: Aug. 26, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
8103	Top	22	1	0.2022	0.2022	592	0.0850
8105	Top	29	3	1.1066	1.1066	1,745	0.0458
8107	Top	34	9	3.4004	3.4004	6,566	0.0563
8104	Root	22	1	0.1808	0.1808	148	0.0238
8106	Root	29	3	0.4548	0.4548	224	0.0143
8108	Root	34	9	5.4971	5.4971	761	0.00404

Table D-87

## PLANT UPTAKE SUMMARY: RADISHES

Soil: LOAM  
 Radionuclide: CS-137  
 Initial Soil Activity (c/m/gm): 35,530  
 35,460

Container Number: 82  
 Date Planted: July 15, 1965  
 Aug. 17, 1965  
 Date Emerged: Aug. 26, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
8203	Top	22	9	2.7015	2.7015	5,490	0.0572
8205	Top	29	14	7.1265	7.1265	12,096	0.0478
8207	Top	32	5	2.8603	2.8603	491	0.0483
8209	Top	34	5	1.8803	1.8803	3,842	0.0576
8204	Root	22	9	1.9438	1.9438	1,083	0.0157
8206	Root	29	14	5.2769	5.2769	857	0.00457
8208	Root	32	5	2.4718	2.4718	399	0.00454
8210	Root	34	5	2.2579	2.2579	420	0.00524

Table D-88

## PLANT UPTAKE SUMMARY: RADISHES

Soil: CLAY  
 Radionuclide: CE-144  
 Initial Soil Activity (c/m/gm): 7,663

Container Number: 28  
 Date Planted: July 8, 1965  
 Date Emerged: July 18, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
2803	Whole	11	--	1.0446	1.0446	2,261	0.282

Table D-89

## PLANT UPTAKE SUMMARY: RADISHES

Soil: SAND  
 Radionuclide: RU-106  
 Initial Soil Activity (c/m/gm): 7,138

Container Number: 37  
 Date Planted: July 8, 1965  
 Date Emerged: July 16, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
3703	Whole	11	--	2.7425	2.7425	12,520	0.640



Table D-90

## PLANT UPTAKE SUMMARY: RADISHES

Soil: LOAM  
 Radionuclide: RU-106  
 Initial Soil Activity (c/m/gm): 7,033

Container Number: 36  
 Date Planted: July 8, 1965  
 Date Emerged: July 18, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup> SU</u>
3603	Whole	11	--	1.0693	1.0693	2,639	0.351

Table D-91

## PLANT UPTAKE SUMMARY: RADISHES

Soil: SAND  
 Radionuclide: ZR-NB-95  
 Initial Soil Activity (c/m/gm): 74,320

Container Number: 65  
 Date Planted: July 15, 1965  
 Date Emerged: July 22, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup> SU</u>
6503	Top	20	15	4.7801	4.7801	30,168	0.0849
6504	Root	20	15	2.9608	2.9608	3,837	0.0174

Table D-92

## PLANT UPTAKE SUMMARY: RADISHES

Soil: LOAM  
 Radionuclide: ZR-NB-95  
 Initial Soil Activity (c/m/gm): 72,540

Container Number: 64  
 Date Planted: July 15, 1965  
 Date Emerged: July 25, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
6403	Top	20	10	2.1186	2.1186	17,103	0.111
6405	Top	29	16	6.1831	6.1831	21,638	0.0482
6404	Root	20	10	0.9093	0.9093	1,206	0.0183
6406	Root	29	16	6.2985	6.2985	3,010	0.00659

Table D-93

## PLANT UPTAKE SUMMARY: RADISHES

Soil: SAND  
 Radionuclide: CE-144  
 Initial Soil Activity (c/m/gm): 7,702

Container Number: 27  
 Date Planted: July 8, 1965  
 Date Emerged: July 16, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
2703	Whole	11	--	2.4250	2.4250	9,787	0.524

Table D-94

## PLANT UPTAKE SUMMARY: RADISHES

Soil: LOAM

Radionuclide: CE-144

Initial Soil Activity (c/m/gm): 7,477  
6,683

Container Number: 26

Date Planted: July 8, 1965

Aug. 16, 1965

Date Emerged: July 19, 1965

Aug. 25, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
2603	Whole	11	--	0.8035	0.8035	1,353	0.225
2606	Whole	15	20	0.8088	0.8088	611	0.113
2607	Top	22	10	2.4036	2.4036	1,182	0.0736
2604	Top	36	1	0.6049	0.6049	617	0.136
2608	Root	22	10	0.6355	0.6355	105	0.0247
2605	Root	36	1	0.6321	0.6321	11	0.00233

Table D-95

## PLANT UPTAKE SUMMARY: RADISHES

Soil: SAND

Radionuclide: Control

Initial Soil Activity (c/m/gm): --

Container Number: 63

Date Planted: July 15, 1965

Date Emerged: July 22, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
6301	Top	22	10	3.3381	3.3381	271	
6303	Top	25	4	1.5197	1.5197	68	
6302	Root	22	10	3.3509	3.3509	41	
6304	Root	25	4	1.1399	1.1399	0	

Table D-96

## PLANT UPTAKE SUMMARY: RADISHES

Soil: LOAM  
 Radionuclide: Control  
 Initial Soil Activity (c/m/gm): --

Container Number: 83  
 Date Planted: July 15, 1965  
 Aug. 17, 1965  
 Date Emerged: Aug. 26, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
8303	Top	30	7	3.1730	3.1730	82	
8301	Top	32	5	1.7038	1.7038	50	
8305	Top	42	10	4.6570	4.6570	94	
8304	Root	30	7	3.6796	3.6796	20	
8302	Root	32	5	1.3504	1.3504	0	
8306	Root	42	10	6.7156	6.7156	22	

Table D-97

## PLANT UPTAKE SUMMARY: RADISHES

Soil: CLAY  
 Radionuclide: Control  
 Initial Soil Activity (c/m/gm): --

Container Number: 62  
 Date Planted: July 15, 1965  
 Date Emerged: July 23, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
6201	Top	22	6	0.8378	0.8378	10	
6203	Top	25	9	1.4098	1.4098	75	
6202	Root	22	6	0.7113	0.7113	5	
6204	Root	25	9	1.2260	1.2260	40	

Table D-98

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: SAND

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 8,208

Container Number: 87

Date Planted: July 23, 1965

Date Emerged: Aug. 2, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
8703	Shoot	27	10	0.9311	0.9311	120,670	15.8
8705	Top	35	10	4.5079	4.5079	440,656	11.9
8707	Top	40	10	8.7009	8.7009	936,128	13.1
8704	Top	35	10	4.7165	4.7165	471,016	12.2
8706	Top	35	10	2.2831	2.2831	220,252	11.8
8708	Top	40	10	7.8920	7.8920	749,467	11.6
8711	Top	53	4	4.7903	4.7903	428,342	10.9
8710	Stem	53	2	4.4290	4.4290	319,476	8.79
8713	Stem	63	1	4.8177	4.8177	396,201	10.0
8716	Stem	74	1	12.4356	12.4356	722,392	7.08
8720	Stem	104	2	8.5605	8.5605	512,424	7.29
8726	Stem	123	4	42.0215	12.7315	657,252	6.29
8709	Leaves	53	2	9.4348	9.4348	820,871	10.6
8712	Leaves	63	1	7.4907	7.4907	766,053	6.45
8715	Leaves	74	1	15.4050	15.4050	1,387,273	11.0
8719	Leaves	104	2	8.8160	8.8160	865,544	12.0
8725	Leaves	123	4	22.1741	9.3241	357,748	4.68
8714	Blossom	63	1	0.1098	0.1098	4,061	4.51
8717	Blossom	74	1	0.3177	0.3177	8,195	3.14
8721	Blossom	104	2	0.3940	0.3940	13,986	4.33
8724	Blossom	116	4	0.9692	0.9692	33,511	4.21
8727	Blossom	123	4	2.3184	2.3184	66,239	3.48
8718	Fruit	74	1	0.9975	0.9975	7,687	0.939
8722	Fruit	104	2	3.1605	3.1605	6,505	0.251
8723	Fruit	116	16	3.0715	3.0715	17,616	0.699
8729	Fruit <sup>a</sup>	123	4	0.2800	0.2800	2,870	1.25
8730	Fruit <sup>b</sup>	123	14	60.4213	16.1859	31,974	0.241
8731m	Fruit <sup>c</sup> (meat)	123	4	24.3085	24.3085	54,140	0.271
8731p	Fruit <sup>c</sup> (peel)	123	4	7.3900	7.3900	25,532	0.421
8728	Root	123	3	9.0909	9.0909	341,784	4.58

a Size 1 (~ 1/2" in diameter)

b Size 2 (~ 1/2" to 1-1/2" in diameter)

c Size 3 (&gt; 1-1/2" in diameter)

Table D-99

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: LOAM  
 Radionuclide: SR-85  
 Initial Soil Activity (c/m/gm): 8,239

Container Number: 88  
 Date Planted: July 23, 1965  
 Date Emerged: Aug. 9, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
8803	Shoot	27	12	0.2081	0.2081	10,700	6.24
8804	Shoot	35	10	0.9505	0.9505	43,478	5.55
8805	Top	40	20	4.6553	4.6553	212,963	5.55
8807	Stem	53	3	1.1576	1.1576	35,574	3.73
8809	Stem	63	1	2.2756	2.2756	29,410	1.57
8811	Stem	74	3	9.5161	9.5161	108,340	1.38
8814	Stem	104	1	19.3350	19.3350	77,571	0.487
8820	Stem	123	4	49.5590	13.5090	142,764	1.28
8806	Leaves	53	3	3.4225	3.4225	125,298	4.44
8808	Leaves	63	1	5.0285	5.0285	86,794	2.09
8810	Leaves	74	3	16.3624	16.3624	309,054	2.29
8813	Leaves	104	1	21.7751	21.7751	192,508	1.07
8819	Leaves	123	4	35.8556	16.2956	242,337	1.80
8812	Blossom	74	3	0.1170	0.1170	678	0.704
8815	Blossom	104	1	0.5097	0.5097	1,060	0.252
8818	Blossom	116	4	1.2553	1.2553	3,245	0.314
8821	Blossom	123	4	2.2667	2.2667	13,354	0.715
8816	Fruit	104	1	12.7845	12.7845	1,479	0.0140
8817	Fruit	116	9	3.6715	3.6715	1,299	0.0429
8823	Fruit <sup>a</sup>	123	18	2.8163	2.8163	3,276	0.141
8824	Fruit <sup>b</sup>	123	28	44.0105	14.2645	6,660	0.0567
8825m	Fruit <sup>c</sup> (meat)	123	2	9.8293	9.8293	2,726	0.0337
8825p	Fruit <sup>c</sup> (peel)	123	2	5.0782	5.0782	1,831	0.0438
8822	Root	123	3	13.2296	13.2296	156,993	1.44

a Size 1 (~  $\leq 1/2$ " in diameter)

b Size 2 (~  $1/2$ " to  $1-1/2$ " in diameter)

c Size 3 ( $> 1-1/2$ " in diameter)

Table D-100

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: CLAY

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 8,206

Container Number: 89

Date Planted: July 23, 1965

Date Emerged: July 31, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
8903	Shoot	27	24	0.7329	0.7329	22,054	3.67
8904	Shoot	35	22	0.5879	0.5879	10,501	2.18
8905	Shoot (top)	35	20	1.0290	1.0290	37,634	4.46
8906	Top	40	40	2.7456	2.7456	90,223	4.00
8907	Top	53	5	1.5317	1.5317	41,513	3.30
8915	Top	91	6	7.5887	7.5887	78,480	1.26
8909	Stem	63	10	1.5192	1.5192	27,295	2.19
8911	Stem	74	5	2.3875	2.3875	37,186	1.90
8913	Stem	91	2	3.5392	3.5392	41,223	1.42
8917	Stem	104	1	4.5426	4.5426	38,202	1.02
8923	Stem	123	4	20.4140	8.2440	78,606	1.16
8908	Leaves	63	10	3.7235	3.7235	79,405	2.60
8910	Leaves	74	5	6.0275	6.0275	121,913	2.46
8912	Leaves	91	2	5.6055	5.6055	88,866	1.93
8916	Leaves	104	1	6.2541	6.2541	97,988	1.91
8922	Leaves	123	4	18.3345	9.9745	156,127	1.91
8914	Blossom	91	2	0.1752	0.1752	913	0.635
8918	Blossom	104	1	0.2146	0.2146	911	0.517
8921	Blossom	116	4	1.1753	1.1753	10,007	1.04
8924	Blossom	123	4	1.4990	1.4990	13,123	1.07
8919	Fruit	104	1	0.6770	0.6770	417	0.0751
8920	Fruit	116	7	1.2545	1.2545	2,619	0.254
8926	Fruit <sup>a</sup>	123	8	0.9986	0.9986	2,226	0.272
8927	Fruit <sup>b</sup>	123	12	23.7900	14.4036	18,091	0.153
8928m	Fruit <sup>c</sup> (meat)	123	3	9.3323	9.3323	9,796	0.128
8928p	Fruit <sup>c</sup> (peel)	123	3	3.9383	3.9383	8,304	0.257
8925	Root	123	3	5.7347	5.7347	52,262	1.11

a Size 1 (~ ≤1/2" in diameter)

b Size 2 (~ 1/2" to 1-1/2" in diameter)

c Size 3 (&gt; 1-1/2" in diameter)

Table D-101

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: SAND

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 33,020

Container Number: 49

Date Planted: July 15, 1965

Date Emerged: July 23, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
4903	Shoot	20	10	0.2517	0.2517	1,785	0.215
4904	Shoot	25	30	2.8369	2.8369	17,605	0.188
4905	Shoot	29	13	2.5925	2.5925	13,109	0.153
4906	Top	41	5	7.8360	7.8360	55,712	0.215
4907	Top	41	5	8.2077	8.2077	46,907	0.173
4908	Top	41	5	5.7455	5.7455	23,843	0.126
4913	Top	48	2	11.1737	11.1737	61,716	0.167
4914	Top	48	2	4.2510	4.2510	13,319	0.0949
4910	Stem	41	5	2.6508	2.6508	12,886	0.147
4912	Stem	48	2	5.0688	5.0688	16,461	0.0984
4916	Stem	55	2	6.2445	6.2445	9,361	0.0454
4919	Stem	67	2	14.7888	14.7888	22,263	0.0456
4923	Stem	78	1	8.9368	8.9368	13,897	0.0471
4928	Stem	130	4	38.8880	13.0480	50,532	0.117
4909	Leaves	41	5	5.8107	5.8107	44,308	0.231
4911	Leaves	48	2	9.4646	9.4646	52,653	0.169
4915	Leaves	55	2	11.9976	11.9976	33,687	0.0850
4918	Leaves	67	2	19.0386	19.0386	89,608	0.143
4922	Leaves	78	1	8.3296	8.3296	29,964	0.109
4927	Leaves	130	4	24.7617	11.9917	89,187	0.225
4917	Blossom	55	2	0.0713	0.0713	247	0.105
4920	Blossom	67	2	0.5640	0.5640	1,243	0.0668
4924	Blossom	78	1	0.2501	0.2501	478	0.0579
4929	Blossom	130	1	1.8354	1.8354	6,278	0.104
4921	Fruit	67	1	0.9311	0.9311	1,262	0.0410
4925	Fruit	123	3	15.1012	15.1012	49,055	0.0984
4926m	Fruit (meat)	123	2	15.7077	15.7077	29,921	0.0577
4926p	Fruit (peel)	123	2	4.4655	4.4655	6,807	0.0462
4931	Fruit <sup>a</sup>	130	14	2.9887	2.9887	6,516	0.0660
4932	Fruit <sup>b</sup>	130	20	32.3266	9.9911	26,217	0.0795
4933m	Fruit <sup>c</sup> (meat)	130	4	10.0624	10.0624	28,405	0.0855
4933p	Fruit <sup>c</sup> (peel)	130	4	4.7540	4.7540	12,724	0.0810
4930	Root	130	3	11.4654	11.4654	57,118	0.151

a Size 1 (~ 1/2" in diameter)

b Size 2 (~ 1/2" to 1-1/2" in diameter)

c Size 3 (&gt; 1-1/2" in diameter)



Table D-102

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: LOAM

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 35,720

Container Number: 51

Date Planted: July 15, 1965

Date Emerged: July 27, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
5103	Shoot	41	2	0.8157	0.8157	1,223	0.0420
5104	Top	48	20	1.7937	1.7937	2,305	0.0360
5105	Top	55	1	1.8500	1.8500	3,564	0.0539
5107	Stem	67	1	0.7246	0.7246	419	0.0162
5109	Stem	78	1	5.0548	5.0548	3,687	0.0204
5112	Stem	85	1	3.0395	3.0395	916	0.00844
5115	Stem	92	1	1.8258	1.8258	319	0.00489
5118	Stem	130	3	24.4527	11.3427	17,290	0.0427
5106	Leaves	67	1	1.8851	1.8851	5,272	0.0783
5108	Leaves	78	1	9.2815	9.2815	20,134	0.0607
5111	Leaves	85	1	5.0291	5.0291	3,025	0.0168
5114	Leaves	92	1	2.6304	2.6304	1,310	0.0139
5117	Leaves	130	3	27.2270	9.2170	6,765	0.0206
5110	Blossom	78	1	0.0469	0.0469	33	0.0250
5113	Blossom	85	1	1.2114	1.2114	104	0.00240
5119	Blossom	130	3	1.7536	1.7536	589	0.00940
5116	Fruit	123	5	3.9435	3.9435	110	0.000781
5121	Fruit <sup>a</sup>	130	27	5.5110	5.5110	145	0.000737
5122	Fruit <sup>b</sup>	130	28	52.5367	10.1180	258	0.000714
5123m	Fruit <sup>c</sup> (meat)	130	3	11.9285	11.9285	176	0.000413
5123p	Fruit <sup>c</sup> (peel)	130	3	5.5360	5.5360	111	0.000561
5120	Root	130	3	14.6460	14.6460	12,815	0.0245

a Size 1 (~ ≤1/2" in diameter)

b Size 2 (~ 1/2" to 1-1/2" in diameter)

c Size 3 (&gt; 1-1/2" in diameter)

Table D-103

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: CLAY  
 Radionuclide: CS-137  
 Initial Soil Activity (c/m/gm): 32,690

Container Number: 50  
 Date Planted: July 15, 1965  
 Date Emerged: July 22, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
5003	Shoot	20	10	0.1778	0.1778	774	0.133
5004	Shoot	29	20	0.8120	0.8120	2,538	0.0956
5005	Shoot	41	25	3.0227	3.0227	7,697	0.0779
5006	Top	48	20	8.7645	8.7645	15,739	0.0549
5007	Top	55	1	0.7044	0.7044	985	0.0428
5009	Stem	67	4	3.6648	3.6648	2,707	0.0226
5011	Stem	78	3	2.7596	2.7596	3,164	0.0351
5013	Stem	85	3	6.4432	6.4432	5,174	0.0246
5016	Stem	92	1	4.0406	4.0406	3,437	0.0260
5019	Stem	123	2	8.2590	8.2590	13,355	0.0495
5023	Stem	130	4	12.5338	12.5338	12,196	0.0298
5008	Leaves	67	4	8.0434	8.0434	19,440	0.0729
5010	Leaves	78	3	5.2330	5.2330	18,204	0.106
5012	Leaves	85	3	7.3188	7.3188	17,271	0.0722
5015	Leaves	92	1	3.3365	3.3365	15,064	0.138
5018	Leaves	123	2	6.8004	6.8004	19,801	0.0891
5022	Leaves	130	4	12.6517	12.6517	29,892	0.0723
5014	Blossom	85	3	0.2083	0.2083	305	0.0448
5017	Blossom	92	1	0.1439	0.1439	116	0.0247
5020	Blossom	123	2	0.6075	0.6075	647	0.0326
5024	Blossom	130	4	1.1910	1.1910	821	0.0211
5021	Fruit	123	2	0.5837	0.5837	284	0.0149
5026	Fruit <sup>a</sup>	130	15	5.0335	5.0335	4,233	0.0257
5027	Fruit <sup>b</sup>	130	5	13.9205	13.9205	6,240	0.0137
5028m	Fruit <sup>c</sup>						
	(meat)	130	2	5.6531	5.6531	3,029	0.0164
5028p	Fruit <sup>c</sup>						
	(peel)	130	2	3.3692	3.3692	1,902	0.0173
5025	Root	130	3	5.0274	5.0274	25,680	0.156

a Size 1 (~ ≤1/2" in diameter)

b Size 2 (~ 1/2" to 1-1/2" in diameter)

c Size 3 (> 1-1/2" in diameter)

Table D-104

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: SAND

Radionuclide: RU-106

Initial Soil Activity (c/m/gm): 7,138

Container Number: 41

Date Planted: July 8, 1965

Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
4103	Shoot	32	10	2.3155	2.3155	9,749	0.590
4104	Shoot	36	2	0.8110	0.8110	2,211	0.382
4107	Top	47	1	3.0769	3.0769	4,946	0.225
4108	Top	47	1	2.4948	2.4948	1,657	0.0930
4109	Top	47	1	2.7164	2.7164	2,299	0.119
4110	Top	54	1	3.4918	3.4918	4,038	0.162
4113	Top	54	1	3.1686	3.1686	1,835	0.0811
4106	Stem	47	1	0.8656	0.8656	449	0.0727
4112	Stem	54	1	3.5426	3.5426	724	0.0286
4115	Stem	55	2	8.2190	8.2190	2,045	0.0349
4118	Stem	61	1	3.7986	3.7986	721	0.266
4123	Stem	137	4	53.7298	10.9498	2,201	0.0282
4105	Leaves	47	1	1.9104	1.9104	2,645	0.194
4111	Leaves	54	1	7.1540	7.1540	5,840	0.114
4114	Leaves	55	2	13.0511	13.0511	15,181	0.163
4117	Leaves	61	1	7.7138	7.7138	6,968	0.126
4122	Leaves	137	4	30.3275	13.9975	23,165	0.232
4116	Blossom	55	2	0.0724	0.0724	74	0.143
4119	Blossom	61	1	0.0714	0.0714	32	0.0628
4124	Blossom	137	4	2.7816	2.7816	2,086	0.105
4120	Fruit	119	2	13.5609	13.5609	556	0.00574
4121	Fruit	130	1	9.4930	9.4930	388	0.00573
4126	Fruit <sup>a</sup>	137	18	3.2950	3.2950	169	0.00718
4127	Fruit <sup>b</sup>	137	32	44.1311	13.1469	488	0.00520
4128m	Fruit <sup>c</sup>						
	(meat)	137	8	18.7105	18.7105	593	0.00444
4128p	Fruit <sup>c</sup>						
	(peel)	137	8	9.3770	9.3770	597	0.00892
4125	Root	137	3	11.1060	11.1060	44,592	0.562

a Size 1 (~ ≤1/2" in diameter)

b Size 2 (~ 1/2" to 1-1/2" in diameter)

c Size 3 (&gt; 1-1/2" in diameter)

Table D-105

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: LOAM

Radionuclide: RU-106

Initial Soil Activity (c/m/gm): 6,925  
6,418

Container Number: 40

Date Planted: July 8, 1965

Aug. 16, 1965

Date Emerged: July 19, 1965

Aug. 25, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
4004	Shoot	15	5	0.1155	0.1155	152	0.204
4005	Shoot	22	10	0.2396	0.2396	326	0.212
4006	Shoot	31	30	1.9652	1.9652	2,521	0.200
4003	Shoot	39	5	1.3055	1.3055	1,173	0.130
4007	Top	42	12	3.5187	3.5187	2,971	0.132
4010	Top	51	10	2.3278	2.3278	2,343	0.157
4009	Stem	51	6	0.7690	0.7690	348	0.0706
4012	Stem	60	3	1.2832	1.2832	226	0.0274
4014	Stem	74	2	2.6510	2.6510	710	0.0417
4018	Stem	98	2	24.8108	13.4908	2,838	0.0328
4008	Leaves	51	6	2.0965	2.0965	2,982	0.222
4011	Leaves	60	3	3.3026	3.3026	2,159	0.102
4013	Leaves	74	2	5.2432	5.2432	3,294	0.0979
4017	Leaves	98	2	31.5471	12.6171	6,824	0.0843
4015	Blossom	74	1	0.0398	0.0398	42	0.164
4019	Blossom	98	2	1.9465	1.9465	565	0.0452
4016	Fruit	91	2	0.8794	0.8794	26	0.00461
4021	Fruit <sup>a</sup>	98	8	1.1122	1.1122	2	0.000280
4022	Fruit <sup>b</sup>	98	4	4.4503	4.4503	21	0.000735
4020	Root	98	2	5.2220	5.2220	5,192	0.155

<sup>a</sup> Size 1 (~ ≤ 1/2" in diameter)<sup>b</sup> Size 2 (~ 1/2" to 1-1/2" in diameter)

Table D-106

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: SAND

Radionuclide: ZR-NB-95

Initial Soil Activity (c/m/gm): 73,220

Container Number: 48

Date Planted: July 15, 1965

Date Emerged: July 23, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
4803	Shoot	20	10	0.1240	0.1240	897	0.0988
4804	Shoot	25	20	0.9670	0.9670	21,393	0.302
4805	Shoot	29	9	0.9407	0.9407	8,815	0.128
4806	Top	40	4	4.3870	4.3870	9,442	0.0294
4807	Top	40	4	5.2434	5.2434	12,178	0.0317
4808	Top	40	4	3.4680	3.4680	6,234	0.0246
4809	Top	48	4	8.6118	8.6118	34,785	0.0552
4810	Top	48	4	8.6843	8.6843	15,987	0.0251
4812	Stem	54	2	3.2490	3.2490	4,210	0.0177
4814	Stem	63	1	4.4305	4.4305	1,722	0.00531
4817	Stem	75	1	7.6595	7.6595	4,658	0.00830
4823	Stem	130	4	41.2758	15.1958	12,543	0.0113
4811	Leaves	54	2	7.0221	7.0221	13,244	0.0258
4813	Leaves	63	1	7.3602	7.3602	24,587	0.0456
4816	Leaves	75	1	9.7955	9.7955	82,997	0.116
4822	Leaves	130	4	22.5400	10.7800	59,120	0.0749
4815	Blossom	63	1	0.0530	0.0530	28	0.00716
4818	Blossom	75	1	0.0383	0.0383	60	0.0214
4824	Blossom	130	4	2.4294	2.4294	2,329	0.0131
4819	Fruit	75	1	1.3382	1.3382	91	0.000929
4820	Fruit	123	4	24.0815	24.0815	1,037	0.000248
4821m	Fruit (meat)	123	3	18.1515	18.1515	494	0.000372
4821p	Fruit (peel)	123	3	5.0031	5.0031	424	0.00116
4826	Fruit <sup>a</sup>	130	25	13.7347	13.7347	260	0.000258
4827	Fruit <sup>b</sup>	130	14	26.6673	12.6130	298	0.000323
4828m	Fruit <sup>c</sup> (meat)	130	4	10.9532	10.9532	180	0.000224
4828p	Fruit <sup>c</sup> (peel)	130	4	5.4550	5.4550	274	0.000686
4825	Root	130	3	8.8733	8.8733	110,008	0.169

a Size 1 (~ ≤1/2" in diameter)

b Size 2 (~ 1/2" to 1-1/2" in diameter)

c Size 3 (&gt; 1-1/2" in diameter)

Table D-107

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: LOAM  
 Radionuclide: ZR-NB-95  
 Initial Soil Activity (c/m/gm): 74,290

Container Number: 47  
 Date Planted: July 15, 1965  
 Date Emerged: July 25, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
4703	Shoot	29	5	0.2731	0.2731	957	0.0472
4704	Top	40	2	2.2203	2.2203	5,293	0.0321
4707	Top	48	20	3.9875	3.9875	13,187	0.0445
4708	Top	54	5	4.6674	4.6674	6,410	0.0185
4706	Stem	48	3	1.9366	1.9366	1,833	0.0127
4710	Stem	63	1	6.1242	6.1242	2,063	0.00454
4713	Stem	75	1	5.1895	5.1895	4,652	0.0121
4715	Stem	85	1	12.3630	12.3630	18,396	0.0200
4719	Stem	92	1	1.9576	1.9576	208	0.00143
4723	Stem	130	3	28.5741	10.8741	12,263	0.0152
4705	Leaves	48	3	4.0969	4.0969	10,509	0.0345
4709	Leaves	63	1	12.4360	12.4360	6,630	0.00718
4712	Leaves	75	1	8.2531	8.2531	52,333	0.0854
4714	Leaves	85	1	15.0759	15.0759	42,877	0.0383
4718	Leaves	92	1	3.2577	3.2577	2,150	0.00888
4722	Leaves	130	3	27.2985	15.4685	138,662	0.121
4711	Blossom	63	1	0.0467	0.0467	53	0.0153
4716	Blossom	85	1	0.3787	0.3787	152	0.00540
4720	Blossom	92	1	0.0610	0.0610	0	0.0
4724	Blossom	130	3	1.2935	1.2935	1,646	0.0171
4717	Fruit	85	1	0.2164	0.2164	9	0.000560
4721	Fruit	123	2	13.0773	13.0773	315	0.000324
4726	Fruit <sup>a</sup>	130	4	1.3916	1.3916	0	0.0
4727	Fruit <sup>b</sup>	130	10	22.5181	10.7438	276	0.000346
4728m	Fruit <sup>c</sup> (meat)	130	4	13.8709	13.8709	632	0.000613
4728p	Fruit <sup>c</sup> (peel)	130	4	7.8960	7.8960	304	0.000518
4725	Root	130	3	11.5571	11.5571	92,423	0.108

a Size 1 (~ ≤1/2" in diameter)

b Size 2 (~ 1/2" to 1-1/2" in diameter)

c Size 3 (> 1-1/2" in diameter)

Table D-108

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: SAND

Container Number: 5

Radionuclide: CE-144

Date Planted: July 8, 1965

Initial Soil Activity (c/m/gm): 7,327

Date Emerged: July 18, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
503	Shoot	27	5	0.1523	0.1523	407	0.365
504	Shoot	32	20	4.8522	4.8522	12,270	0.345
505	Shoot	36	3	1.2336	1.2336	2,685	0.297
506	Top	46	1	4.0500	4.0500	4,302	0.145
507	Top	46	1	5.1184	5.1184	4,282	0.114
508	Top	46	1	3.1297	3.1297	2,131	0.0929
511	Top	46	2	7.5942	7.5942	5,970	0.107
512	Top	46	2	4.4252	4.4252	2,986	0.0921
513	Top	46	3	4.1957	4.1957	2,382	0.0970
514	Top	54	1	7.1044	7.1044	4,182	0.0803
517	Top	54	1	4.6184	4.6184	6,320	0.187
518	Top	61	1	12.7108	12.7108	7,367	0.0791
510	Stem	46	1	2.7167	2.7167	761	0.0382
516	Stem	54	1	3.0245	3.0245	736	0.0332
520	Stem	61	1	6.8252	6.8252	688	0.0138
522	Stem	70	1	7.1927	7.1927	434	0.00824
529	Stem	137	4	44.4845	12.6045	5,720	0.0619
509	Leaves	46	1	5.2657	5.2657	4,658	0.121
515	Leaves	54	1	4.7630	4.7630	5,764	0.165
519	Leaves	61	1	10.4666	10.4666	13,196	0.172
521	Leaves	70	1	7.2977	7.2977	3,544	0.0663
528	Leaves	137	4	20.4720	11.5320	21,402	0.253
523	Blossom	70	1	0.1198	0.1198	0	0.0
530	Blossom	137	4	1.6675	1.6675	759	0.0621
524	Fruit	90	1	5.4830	5.4830	1,722	0.0429
525	Fruit	113	7	38.7759	38.7759	770	0.00271
526	Fruit	119	2	12.6053	12.6053	181	0.00196
527	Fruit	130	1	4.4605	4.4605	84	0.00257
532	Fruit <sup>a</sup>	137	7	3.2847	3.2847	115	0.00478
533	Fruit <sup>b</sup>	137	17	34.9870	10.8632	260	0.00327
534m	Fruit <sup>c</sup> (meat)	137	5	19.3654	19.3654	435	0.00306
534p	Fruit <sup>c</sup> (peel)	137	5	8.8030	8.8030	363	0.00363
531	Root	137	2	6.8177	6.8177	16,422	0.329

a Size 1 (~ 5/16" in diameter)

b Size 2 (~ 1/8" to 1-1/8" in diameter)

c Size 3 (&gt; 1-1/8" in diameter)

Table D-109

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: LOAM  
 Radionuclide: CE-144  
 Initial Soil Activity (c/m/gm): 7,401

Container Number: 4  
 Date Planted: July 8, 1965  
 Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
404	Shoot	54	4	0.2291	0.2291	197	0.116
403	Top	46	4	2.6678	2.6678	1,835	0.0929
405	Top	54	1	5.3907	5.3907	1,751	0.0439
406	Top	55	10	0.4870	0.4870	392	0.109
407	Top	61	1	0.5890	0.5890	838	0.192
408	Top	70	3	1.2201	1.2201	915	0.101
410	Stem	81	3	1.9268	1.9268	792	0.0555
412	Stem	99	1	0.9943	0.9943	509	0.0692
416	Stem	137	3	35.8022	10.5722	13,400	0.171
409	Leaves	81	3	4.1533	4.1533	3,764	0.122
411	Leaves	99	1	2.1136	2.1136	3,991	0.255
415	Leaves	137	3	39.4113	11.1163	33,858	0.412
413	Blossom	99	1	0.0790	0.0790	0	0.0
417	Blossom	137	3	1.1533	1.1533	1,162	0.136
414	Fruit	130	3	1.9791	1.9791	38	0.00259
419	Fruit <sup>a</sup>	137	9	0.9122	0.9122	33	0.00489
420	Fruit <sup>b</sup>	137	8	13.0422	13.0422	83	0.000860
421m	Fruit <sup>c</sup> (meat)	137	5	15.5096	15.5096	21	0.000183
421p	Fruit <sup>c</sup> (peel)	137	5	6.5020	6.5020	215	0.00447
418	Root	137	2	7.8253	7.8253	5,246	0.0906

<sup>a</sup> Size 1 (~ 1/2" in diameter)

<sup>b</sup> Size 2 (~ 1/2" to 1-1/2" in diameter)

<sup>c</sup> Size 3 (> 1-1/2" in diameter)



Table D-110

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: CLAY

Radionuclide: CE-144

Initial Soil Activity (c/m/gm): 7,702

Container Number: 6

Date Planted: July 8, 1965

Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
603	Shoot	27	10	0.1108	0.1108	486	0.570
604	Shoot	36	25	0.6723	0.6723	2,058	0.397
605	Top	46	20	1.5560	1.5560	4,497	0.375
606	Top	54	20	2.3664	2.3664	3,317	0.182
607	Top	55	10	2.7130	2.7130	4,210	0.202
608	Top	70	3	1.5475	1.5475	1,170	0.0982
610	Stem	70	4	1.3436	1.3436	410	0.0396
612	Stem	81	3	3.3666	3.3666	957	0.0369
614	Stem	90	4	2.2912	2.2912	1,116	0.0632
616	Stem	99	2	3.0514	3.0514	1,339	0.0570
620	Stem	137	4	28.7599	11.7999	4,200	0.0462
609	Leaves	70	4	3.9362	3.9362	3,102	0.102
611	Leaves	81	3	6.6899	6.6899	8,714	0.169
613	Leaves	90	4	4.9946	4.9946	9,361	0.243
615	Leaves	99	2	3.9808	3.9808	3,706	0.121
619	Leaves	137	4	31.1442	13.6542	25,509	0.242
617	Blossom	99	2	0.0514	0.0514	31	0.0783
621	Blossom	137	4	1.9441	1.9441	449	0.0300
618	Fruit	130	2	0.9470	0.9470	0	0.0
623	Fruit <sup>a</sup>	137	9	1.3985	1.3985	75	0.00696
624	Fruit <sup>b</sup>	137	7	12.9020	12.9020	111	0.00112
625m	Fruit <sup>c</sup> (meat)	137	4	10.8337	10.8337	115	0.00138
625p	Fruit <sup>c</sup> (peel)	137	4	4.3046	4.3046	43	0.00130
622	Root	137	2	9.0081	9.0081	20,319	0.293

a Size 1 (~ 1/2" in diameter)

b Size 2 (~ 1/2" to 1-1/2" in diameter)

c Size 3 (&gt; 1-1/2" in diameter)

Table D-111

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: SAND

Radionuclide: Control

Initial Soil Activity (c/m/gm): -

Container Number: 34

Date Planted: July 8, 1965

Date Emerged: July 18, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
3401	Shoot	32	10	2.4519	2.4519	40	
3402	Shoot	39	3	1.6636	1.6636	24	
3404	Top	49	1	6.9312	6.9312	43	
3403	Top	49	1	4.0260	4.0260	20	
3406	Stem	49	2	3.3212	3.3212	0	
3408	Stem	55	2	9.3960	9.3960	257	
3411	Stem	137	1	14.7275	14.7275	224	
3405	Leaves	49	2	7.1324	7.1324	21	
3407	Leaves	55	2	13.5420	13.5420	719	
3410	Leaves	137	1	15.1509	15.1509	522	
3409	Blossom	55	2	0.1018	0.1018	5	
3412	Blossom	137	1	1.5870	1.5870	43	
3414	Fruit	137	25	55.6501	13.8443	45	
3413	Root	137	1	4.7202	4.7202	70	

Table D-112

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: LOAM

Radionuclide: Control

Initial Soil Activity (c/m/gm): -

Container Number: 35

Date Planted: July 23, 1965

Date Emerged: Aug. 1, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup> SU</u>
3501	Shoot	55	8	0.2647	0.2647	0	
3502	Shoot	67	10	1.3380	1.3380	20	
3503	Top	84	5	3.0065	3.0065	44	
3504	Top	98	5	4.5300	4.5300	21	
3507	Stem	122	1	8.4384	8.4384	135	
3506	Leaves	122	1	15.4169	15.4169	400	
3508	Blossom	122	1	0.7720	0.7720	28	
3510	Fruit	122	2	5.2431	5.2431	47	
3509	Root	122	1	3.7670	3.7670	246	

Table D-113

## PLANT UPTAKE SUMMARY: TOMATOES

Soil: CLAY

Container Number: 33

Radionuclide: Control

Date Planted: July 8, 1965

Initial Soil Activity (c/m/gm): -

Date Emerged: July 18, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
3301	Shoot	27	10	0.1349	0.1349	0	
3302	Shoot	39	9	0.2840	0.2840	10	
3303	Shoot	49	12	0.5945	0.5945	8	
3304	Top	55	20	3.0896	3.0896	147	
3305	Top	70	3	1.7199	1.7199	18	
3307	Stem	82	2	1.9695	1.9695	17	
3309	Stem	99	2	5.3137	5.3137	29	
3312	Stem	113	1	3.0139	3.0139	1	
3316	Stem	137	1	9.6360	9.6360	1,070	
3306	Leaves	82	2	3.8402	3.8402	12	
3308	Leaves	99	2	8.4986	8.4986	99	
3311	Leaves	113	1	3.8920	3.8920	27	
3315	Leaves	137	1	12.4646	12.4646	2	
3310	Blossom	99	2	0.1858	0.1858	8	
3313	Blossom	113	1	0.0605	0.0605	0	
3317	Blossom	137	1	1.4911	1.4911	85	
3314	Fruit	113	1	0.9405	0.9405	0	
3319	Fruit	137	20	43.3379	15.6322	57	
3318	Root	137	1	2.2958	2.2958	0	

Table D-114

## PLANT UPTAKE SUMMARY: WHEAT

Soil: SAND

Container Number: 97

Radionuclide: SR-85

Date Planted: July 23, 1965

Initial Soil Activity (c/m/gm): 8,288

Date Emerged: July 27, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
9703	Shoot	12	7	0.1920	0.1920	8,916	5.60
9704	Stalk	27	34	2.9957	2.9957	61,320	2.47
9705	Stalk	35	16	3.9825	3.9825	65,053	1.97
9706	Stalk	42	5	1.9345	1.9345	28,181	1.76
9708	Stalk	53	5	2.9219	2.9219	40,334	1.67
9710	Stalk	63	5	3.7054	3.7054	57,322	1.87
9712	Stalk	74	5	3.7557	3.7557	55,186	1.77
9715	Stalk	80	375	149.9165	8.6065	150,449	2.11
9707	Head	42	5	0.7708	0.7708	4,053	0.634
9709	Head	53	5	1.0101	1.0101	5,318	0.635
9711	Head	63	5	1.3601	1.3601	7,661	0.680
9713	Head	74	5	2.0600	2.0600	9,100	0.523
9716	Head	80	375	138.0429	12.7929	54,310	0.512
9714	Leaves	80	375	59.7120	6.6920	236,847	4.27
9717	Root	80	100	11.0921	5.4921	73,608	1.62
9716G	Grain	80	375	55.2	10	25,575	0.309
9716C	Chaff	80			6.5	3,720	0.0690

Table D-115

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM

Container Number: 114

Radionuclide: SR-85

Date Planted: July 23, 1965

Initial Soil Activity (c/m/gm): 8,545

Date Emerged: July 29, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
11403	Shoot	12	5	0.1222	0.1222	1,278	1.22
11404	Stalk	27	35	2.5778	2.5778	16,460	0.747
11405	Stalk	35	24	3.7702	3.7702	25,805	0.801
11406	Stalk	42	4	1.7645	1.7645	5,755	0.382
11408	Stalk	53	5	2.3801	2.3801	10,761	0.529
11410	Stalk	63	5	3.0780	3.0780	11,423	0.434
11412	Stalk	74	5	4.0980	4.0980	12,148	0.347
11415	Stalk	92	364	176.4168	9.4668	42,545	0.526
11407	Head	42	4	0.4817	0.4817	219	0.0532
11409	Head	53	5	0.8603	0.8603	1,066	0.145
11411	Head	63	5	1.2513	1.2513	1,619	0.151
11413	Head	74	5	2.2490	2.2490	1,943	0.101
11416	Head	92	364	172.5493	11.5393	11,564	0.117
11414	Leaves	92	364	33.6675	9.0675	85,628	1.11
11417	Root	92	89	5.6081	5.6081	24,882	0.519
11416G	Grain	92	364	111.3527	10.3327	9,709	0.110
11416C	Chaff	92			5.2310	1,958	0.0438

Table D-116

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM

Container Number: 117

Radionuclide: SR-85<sup>a</sup>

Date Planted: July 23, 1965

Initial Soil Activity (c/m/gm): 8,501

Date Emerged: July 29, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
11703	Shoot	12	5	0.1052	0.1052	305	0.341
11704	Stalk	27	30	1.9500	1.9500	3,125	0.189
11705	Stalk	35	18	2.9760	2.9760	4,840	0.191
11706	Stalk	42	5	1.7092	1.7092	1,998	0.138
11708	Stalk	53	5	2.7741	2.7741	2,536	0.108
11710	Stalk	63	5	3.4300	3.4300	3,907	0.134
11712	Stalk	74	5	3.5285	3.5285	3,506	0.117
11715	Stalk	92	366	150.2418	7.4818	11,972	0.188
11707	Head	42	5	0.6772	0.6772	154	0.0268
11709	Head	53	5	1.1408	1.1408	477	0.0492
11711	Head	63	5	1.8045	1.8045	678	0.0442
11713	Head	74	5	2.8565	2.8565	677	0.0279
11716	Head	92	366	185.1563	17.7863	3,963	0.0262
11714	Leaves	92	366	22.2042	8.3042	32,866	0.466
11717	Root	92	90	5.3815	5.3815	8,550	0.187
11716G	Grain	92	366	130.276	13.6260	4,977	0.0430
11716C	Chaff	92			6.0277	7,588	0.148

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a Albite heated to 600°C

Table D-117

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM

Radionuclide: SR-85<sup>a</sup>

Initial Soil Activity (c/m/gm): 8,501

Container Number: 118

Date Planted: July 23, 1965

Date Emerged: July 28, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
11803	Shoot	12	5	0.1410	0.1410	109	0.0909
11804	Stalk	27	35	2.8095	2.8095	519	0.0217
11805	Stalk	35	25	4.9978	4.9978	1,506	0.0354
11806	Stalk	42	5	2.3503	2.3503	328	0.0164
11808	Stalk	53	6	4.1645	4.1645	633	0.0179
11810	Stalk	63	6	3.1555	3.1555	469	0.0175
11812	Stalk	74	5	2.2862	2.2862	349	0.0180
11815	Stalk	92	366	163.4625	0.0925	1,175	0.0152
11807	Head	42	5	0.8342	0.8342	0	0
11809	Head	53	6	1.3929	1.3929	125	0.0106
11811	Head	63	6	2.1589	2.1589	44	0.00240
11813	Head	74	5	2.0136	2.0136	66	0.00386
11816	Head	92	366	224.1835	17.9635	137	0.000897
11814	Leaves	92	366	29.0662	7.5362	2,582	0.0403
11817	Root	92	57	3.8874	3.8874	2,887	0.0874
11816G	Grain	92	366	142.2647	12.6647	740	0.00687
11816C	Chaff	92			5.0754	2,286	0.0530

<sup>a</sup> Albite heated to 900°C



Table D-118

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM

Radionuclide: SR-85<sup>a</sup>

Initial Soil Activity (c/m/gm): 8,633

Container Number: 98

Date Planted: July 23, 1965

Date Emerged: July 30, 1965

Sample Number	Plant Part	Age (days)	Number or Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
9803	Stalk	27	32	2.4983	2.4983	350	0.0162
9804	Stalk	35	12	2.9468	2.9468	344	0.0135
9805	Stalk	42	4	1.3611	1.3611	179	0.0152
9807	Stalk	53	5	3.9715	3.9715	294	0.00858
9809	Stalk	63	5	2.5379	2.5379	214	0.00977
9811	Stalk	74	6	3.8696	3.8696	294	0.00880
9814	Stalk	92	333	160.1636	9.3936	671	0.00827
9806	Head	42	4	0.5560	0.5560	70	0.0146
9808	Head	53	5	1.2677	1.2677	36	0.00329
9810	Head	63	5	1.6202	1.6202	93	0.00665
9812	Head	74	6	3.0065	3.0065	8	0.000308
9815	Head	92	333	195.0143	20.8243	514	0.00286
9813	Leaves	92	333	31.7182	10.5582	4,350	0.0477
9816	Root	92	78	5.7317	5.7317	3,631	0.0734
9815G	Grain	92	333	128.3277	12.9277	396	0.00355
9815C	Chaff	92			6.4832	--	--

<sup>a</sup> Albite heated to 1000°C

Table D-119

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM

Container Number: 99

Radionuclide: SR-85<sup>a</sup>

Date Planted: July 23, 1965

Initial Soil Activity (c/m/gm): 8,198

Date Emerged: July 28, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
9903	Stalk	27	32	2.8388	2.8388	440	0.0192
9904	Stalk	35	22	6.1308	6.1308	1,226	0.0244
9905	Stalk	42	5	2.1426	2.1426	226	0.0129
9907	Stalk	53	5	3.9634	3.9634	420	0.0129
9909	Stalk	63	5	3.6879	3.6879	322	0.0106
9911	Stalk	74	6	3.7165	3.7165	382	0.0125
9914	Stalk	92	326	141.4015	10.1115	1,219	0.0147
9906	Head	42	5	0.9028	0.9028	0	0
9908	Head	53	5	1.1340	1.1340	17	0.00183
9910	Head	63	5	1.6344	1.6344	61	0.00455
9912	Head	74	6	2.7260	2.7260	170	0.00761
9915	Head	92	326	209.2009	17.3309	478	0.00336
9913	Leaves	92	326	20.2240	7.2940	1,968	0.0329
9916	Root	92	91	7.5185	7.5185	3,497	0.0567
9915G	Grain	92	326	144.7722	14.1722	457	0.00393
9915C	Chaff	9			5.7217	--	

<sup>a</sup> Albite heated to 1500°C

Table D-120

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM

Radionuclide: SR-85<sup>a</sup>

Initial Soil Activity (c/m/gm): 4.239

Container Number: 119

Date Planted: July 23, 1968

Date Emerged: July 28, 1968

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SD
11903	Shoot	12	5	0.2019	0.2019	2.581	1.54
11904	Stalk	27	35	3.3718	3.3718	19.887	0.718
11905	Stalk	35	28	5.2134	5.2134	30.311	0.822
11906	Stalk	42	5	1.7900	1.7900	6.736	0.437
11908	Stalk	53	5	3.1579	3.1579	12.274	0.472
11910	Stalk	63	6	3.3307	3.3307	17.025	0.629
11912	Stalk	74	8	2.0339	2.0339	10.183	0.421
11913	Stalk	92	425	176.1740	9.5240	30.687	0.454
11907	Head	42	5	0.6337	0.6337	562	0.108
11909	Head	53	5	1.0641	1.0641	1,545	0.176
11911	Head	63	5	1.7553	1.7553	2,572	0.173
11913	Head	74	8	3.0905	3.0905	2,571	0.101
11916	Head	92	425	223.8797	22.6707	11,769	0.0630
11914	Leaves	92	425	21.5459	6.3959	55,362	1.05
11917	Root	92	98	6.6948	6.6948	22,442	0.407
11916G	Grain	92	425	145.7	10	5,080	0.0617
11916C	Chaff	92			6.4	8,459	0.160

a No albite; SR-85 sprayed directly into loam

Table D-121

## PLANT UPTAKE SUMMARY: WIKAT

Soil: LOAM

Container Number: 100

Radionuclide:  $^{86}\text{Kr}$ - $^{86}\text{Rb}$ <sup>a</sup>

Date Planted: July 23, 1968

Initial Soil Activity (cpm/gm): --

Date Emerged: July 28, 1968

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (cpm)
10003	Shoot	12	5	0.1094	0.1094	37
10004	Stalk	27	34	2.9218	2.9218	187
10005	Stalk	36	15	3.1278	3.1278	210
10006	Stalk	42	5	1.9853	1.9853	154
10008	Stalk	53	6	4.2838	4.2838	3,358
10010	Stalk	63	5	2.7885	2.7885	1,334
10012	Stalk	74	5	2.8031	2.8031	1,742
10015	Stalk	82	335	117.4145	8.6745	11,868
10007	Head	42	5	0.8047	0.8047	141
10009	Head	53	6	1.6653	1.6653	491
10011	Head	63	5	1.4458	1.4458	231
10013	Head	74	5	2.0625	2.0625	351
10016	Head	82	335	186.4970	17.4670	5,011
10014	Leaves	82	335	27.1178	7.2178	10,144
10017	Root	82	82	4.6771	4.6771	2,840

<sup>a</sup> Albite placed 18" deep (120.0 gm albite)

Table D-122

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM<sup>a</sup>

Radionuclide: SR-N5

Initial Soil Activity (c/m/gm): 8,633

Container Number: 115

Date Planted: July 23, 1965

Date Emerged: July 29, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	"SU
11503	Stalk	27	35	2,6444	2,6444	12,801	0.561
11504	Stalk	35	22	4,5141	4,5141	19,958	0.512
11505	Stalk	42	4	2,2683	2,2683	4,498	0.230
11507	Stalk	53	5	3,8230	3,8230	8,364	0.253
11509	Stalk	63	5	4,5815	4,5815	5,779	0.146
11511	Stalk	74	6	4,3402	4,3402	8,900	0.238
11514	Stalk	92	414	211,2098	10,2898	25,495	0.510
11506	Head	42	4	0,5617	0,5617	271	0.0559
11508	Head	53	5	1,2741	1,2741	930	0.0846
11510	Head	63	5	1,9781	1,9781	889	0.0520
11512	Head	74	6	2,6680	2,6680	1,463	0.0635
11515	Head	92	414	214,8840	18,2040	7,049	0.0448
11513	Leaves	92	414	37,9258	8,0959	52,054	0.745
11516	Root	92	87	6,2205	6,2205	17,828	0.334
11515G	Grain	92	414	130,5955	16,1455	4,355	0.0312
11515C	Chaff	92			4,5090	5,015	0.129

<sup>a</sup> +100% Cu<sup>++</sup>

Table D-123

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM<sup>a</sup>

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 8,589

Container Number: 116

Date Planted: July 23, 1965

Date Emerged: July 28, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
11603	Shoot	12	5	0.1202	0.1202	1,141	1.11
11604	Stalk	27	35	2.7485	2.7485	14,442	0.612
11605	Stalk	35	26	5.0719	5.0719	23,597	0.542
11606	Stalk	42	5	1.7135	1.7135	6,035	0.410
11608	Stalk	53	5	3.4792	3.4792	6,201	0.208
11610	Stalk	63	6	2.5538	2.5538	6,484	0.296
11612	Stalk	74	5	1.9550	1.9550	6,603	0.393
11615	Stalk	92	494	188.7283	8.5083	24,199	0.331
11607	Head	42	5	0.5352	0.5352	332	0.0722
11609	Head	53	5	1.3154	1.3154	739	0.0654
11611	Head	63	6	1.2592	1.2592	1,093	0.101
11613	Head	74	5	1.4821	1.4821	1,277	0.100
11616	Head	92	494	227.0016	14.4116	8,349	0.0674
11614	Leaves	92	494	27.2468	7.4168	52,452	0.823
11617	Root	92	104	6.5459	6.5459	20,762	0.369
11616G	Grain	92	494	155.8272	11.5772	2,693	0.0271
11616C	Chaff	92			6.3231	8,408	0.155

<sup>a</sup> +200% Ca<sup>++</sup>

Table D-124

## PLANT UPTAKE SUMMARY: WHEAT

Soil: CLAY

Radionuclide: SR-85

Initial Soil Activity (c/m/gm): 8,206

Container Number: 96

Date Planted: July 23, 1965

Date Emerged: July 28, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
9603	Shoot	12	5	0.1434	0.1434	749	0.636
9604	Stalk	27	28	1.1316	1.1316	6,284	0.677
9605	Stalk	35	11	1.3039	1.3039	4,904	0.458
9606	Stalk	42	5	0.8768	0.8768	3,492	0.485
9608	Stalk	53	5	1.2623	1.2623	5,737	0.554
9610	Stalk	63	5	1.9427	1.9427	7,479	0.469
9612	Stalk	74	5	1.3397	1.3397	4,382	0.399
9615	Stalk	92	344	58.0936	7.3136	34,557	0.576
9607	Head	42	5	0.3271	0.3271	483	0.180
9609	Head	53	5	0.4494	0.4494	905	0.245
9611	Head	63	5	1.0394	1.0394	1,359	0.159
9613	Head	74	5	1.2425	1.2425	938	0.0920
9616	Head	92	344	86.2051	12.8051	7,073	0.0673
9614	Leaves	92	344	8.9147	8.9147	50,897	0.696
9617	Root	92	61	1.8415	1.8415	2,443	0.162
9616G	Grain	92	344	--	10	5,360	0.0653
9616C	Chaff	92	--	--	6.4	8,345	0.159

Table D-125

## PLANT UPTAKE SUMMARY: WHEAT

Soil: SAND

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 33,690

Container Number: 56

Date Planted: July 15, 1965

Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>137</sup> SU
5603	Shoot	13	5	0.3500	0.3500	8,659	0.734
5604	Shoot	20	10	0.8244	0.8244	22,987	0.828
5605	Shoot	25	70	5.1877	5.1877	95,087	0.544
5606	Shoot	29	38	4.5891	4.5891	76,300	0.494
5607	Stalk	41	11	3.7855	3.7855	33,464	0.262
5608	Stalk	48	6	2.8070	2.8070	15,270	0.468
5610	Stalk	55	5	2.0457	2.0457	7,965	0.116
5612	Stalk	67	5	2.4990	2.4990	8,130	0.0966
5614	Stalk	78	5	3.3215	3.3215	7,798	0.0097
5617	Stalk	84	360	169.7955	8.1355	23,301	0.0850
5609	Head	48	6	1.0572	1.0572	4,245	0.119
5611	Head	55	5	0.7938	0.7938	2,361	0.0883
5613	Head	67	5	1.7831	1.7831	4,973	0.0828
5615	Head	78	5	2.0585	2.0585	4,765	0.0687
5618	Head	84	360	160.3987	15.5287	33,492	0.0640
5616	Leaves	84	360	34.1625	6.6225	33,451	0.150
5619	Root	84	104	14.0672	4.6572	32,342	0.206
5618G	Grain	84	360	86.2	10	20,150	0.0618
5618C	Chaff	84	--	--	6.2	11,988	0.0593



Table D-128

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM

Container Number: 57

Radionuclide: CS-137

Date Planted: July 15, 1965

Initial Soil Activity (c/m/gm): 35,350

Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
5703	Shoot	13	5	0.1756	0.1756	466	0.0751
5704	Shoot	20	5	0.2834	0.2834	399	0.0398
5705	Shoot	29	16	1.8061	1.8061	1,199	0.0188
5706	Stalk	41	14	3.4921	3.4921	1,445	0.0117
5707	Stalk	48	6	2.3705	2.3705	275	0.00328
5709	Stalk	55	5	2.5044	2.5044	224	0.00253
5711	Stalk	67	5	3.6898	3.6898	293	0.00225
5713	Stalk	78	5	1.7297	1.7297	188	0.00308
5716	Stalk	99	376	125.3308	8.6858	1,040	0.00339
5708	Head	48	6	0.9937	0.9937	96	0.00273
5710	Head	55	5	0.9511	0.9511	68	0.00202
5712	Head	67	5	2.8005	2.8005	174	0.00176
5714	Head	78	5	2.2000	2.2000	72	0.000926
5717	Head	99	376	252.6683	23.8083	634	0.000753
5715	Leaves	99	376	16.5125	6.4075	3,215	0.0142
5718	Root	99	78	2.9104	2.9104	9,512	0.0924
5717G	Grain	99	376	181.2	10	239	0.000677
5717C	Chaff	99	--	--	5.5	252	0.00130

Table D-127

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 35,350

Container Number: 58

Date Planted: July 15, 1965

Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>137</sup> SU
5803	Shoot	13	5	0.1634	0.1634	538	0.0987
5804	Shoot	20	5	0.3070	0.3070	800	0.0781
5805	Shoot	29	20	1.7395	1.7395	1,776	0.0306
5806	Stalk	41	14	3.7100	3.7100	1,249	0.0101
5807	Stalk	48	5	2.6535	2.6535	313	0.00354
5809	Stalk	55	5	3.2337	3.2337	288	0.00267
5811	Stalk	67	5	3.1922	3.1922	407	0.00382
5813	Stalk	78	5	2.6390	2.6390	215	0.00244
5816	Stalk	99	368	109.9430	10.1030	1,283	0.00381
5808	Head	48	5	1.1027	1.1027	71	0.00193
5810	Head	55	5	1.1795	1.1795	33	0.000839
5812	Head	67	5	2.8408	2.8408	132	0.00139
5814	Head	78	5	3.5930	3.5930	90	0.000731
5817	Head	99	368	217.3595	27.9795	660	0.000707
5815	Leaves	99	368	14.2888	6.8288	3,883	0.0170
5818	Root	99	83	5.5017	5.5017	17,198	0.0937
5817G	Grain	99	368	150.3645	13.9145	434	0.000882
5817C	Chaff	99	--	--	5.6918	219	0.00109

Table D-128

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM  
 Radionuclide: CS-137  
 Initial Soil Activity (c/m/gm): 34,990

Container Number: 59  
 Date Planted: July 15, 1965  
 Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
5903	Shoot	13	5	0.1940	0.1940	512	0.0754
5904	Shoot	20	5	0.3486	0.3486	459	0.0376
5905	Shoot	29	30	2.5822	2.5822	1,054	0.0117
5906	Stalk	41	16	3.7885	3.7885	6,713	0.0506
5907	Stalk	48	5	2.7895	2.7895	245	0.00251
5909	Stalk	55	5	2.7312	2.7312	350	0.00366
5911	Stalk	67	5	3.6303	3.6303	311	0.00245
5913	Stalk	78	5	1.6600	1.6600	175	0.00301
5916	Stalk	99	352	119.2479	9.4429	1,308	0.00396
5908	Head	48	5	1.1487	1.1487	79	0.00196
5910	Head	55	5	1.2012	1.2012	78	0.00186
5912	Head	67	5	2.9162	2.9162	139	0.00136
5914	Head	78	5	2.7705	2.7705	106	0.00109
5917	Head	99	352	226.6997	26.3047	784	0.000852
5915	Leaves	99	352	21.720	7.850	4,936	0.0180
5918	Root	99	69	3.7112	3.7112	10,005	0.0770
5917G	Grain	99	352	164.6778	14.4978	500	0.000986
5917C	Chaff	99	--	--	4.8219	245	0.00145

Table D-129

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM<sup>a</sup>

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 35,720

Container Number: 60

Date Planted: July 15, 1965

Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
6003	Shoot	13	5	0.1823	0.1823	212	0.0326
6004	Shoot	20	5	0.4588	0.4588	664	0.0405
6005	Shoot	25	60	4.0237	4.0237	1,478	0.0103
6006	Shoot	29	40	5.0541	5.0541	1,686	0.00934
6007	Stalk	41	19	7.1723	7.1723	1,229	0.00480
6008	Stalk	48	5	3.6801	3.6801	527	0.00401
6010	Stalk	55	5	3.6925	3.6925	277	0.00210
6012	Stalk	67	5	4.0930	4.0930	948	0.00648
6014	Stalk	78	5	2.1285	2.1285	160	0.00210
6017	Stalk	99	302	167.8741	7.8241	512	0.00219
6009	Head	48	5	1.3582	1.3582	150	0.00309
6011	Head	55	5	1.3599	1.3599	53	0.00109
6013	Head	67	5	1.7336	1.7336	90	0.00146
6015	Head	78	5	1.7195	1.7195	80	0.00130
6018	Head	99	302	294.1527	33.1727	446	0.000376
6016	Leaves	99	302	27.0597	6.6097	3,510	0.0148
6019	Root	99	66	5.0262	5.0262	18,151	0.101
6018G	Grain	99	302	217.6375	12.3875	213	0.000481
6018C	Chaff	99	—	—	4.7625	113	0.000664

<sup>a</sup> +25% Ca<sup>++</sup>

Table D-130

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM<sup>a</sup>

Radionuclide: CS-137

Initial Soil Activity (c/m/gm): 34,400

Container Number: 61

Date Planted: July 15, 1965

Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
6103	Shoot	13	5	0.1635	0.1635	219	0.0389
6104	Shoot	20	5	0.4494	0.4494	576	0.0373
6105	Shoot	29	33	3.3282	3.3282	672	0.00587
6106	Stalk	41	17	5.8578	5.8578	710	0.00352
6107	Stalk	48	5	3.2395	3.2395	153	0.00137
6109	Stalk	55	5	4.2315	4.2315	165	0.00113
6111	Stalk	67	7	6.0940	6.0940	509	0.00243
6113	Stalk	78	5	2.4142	2.4142	247	0.00297
6116	Stalk	99	328	156.9160	9.6760	1,058	0.00318
6108	Head	48	5	1.3327	1.3327	30	0.000654
6110	Head	55	5	1.5907	1.5907	53	0.000969
6112	Head	67	7	3.2617	3.2617	48	0.000427
6114	Head	78	5	3.0890	3.0890	77	0.000725
6117	Head	99	328	274.9473	27.1273	309	0.000331
6115	Leaves	99	328	28.6199	7.6599	4,442	0.00318
6118	Root	99	64	3.8250	3.8250	10,187	0.0774
6117G	Grain	99	328	200.8821	16.0821	386	0.000698
6117C	Chaff	99			6.5729	307	0.00136

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a +50% Ca<sup>++</sup>

Table D-131

## PLANT UPTAKE SUMMARY: WHEAT

Soil: CLAY  
 Radionuclide: CS-137  
 Initial Soil Activity (c/m/gm): 32,530

Container Number: 55  
 Date Planted: July 15, 1965  
 Date Emerged: July 19, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup> SU</u>
5503	Shoot	13	5	0.1594	0.1594	2,693	0.159
5504	Shoot	20	10	0.6032	0.6032	4,859	0.248
5505	Shoot	29	16	1.3111	1.3111	5,672	0.133
5506	Stalk	41	11	2.0490	2.0490	3,439	0.0516
5507	Stalk	48	6	1.2724	1.2724	1,859	0.0449
5509	Stalk	55	5	1.0983	1.0983	1,089	0.0305
5511	Stalk	67	4	0.9708	0.9708	973	0.0308
5513	Stalk	78	5	0.5321	0.5321	340	0.0196
5516	Stalk	97	259	29.5227	10.2827	7,601	0.0227
5508	Head	48	6	0.3897	0.3897	436	0.0344
5510	Head	55	5	0.4850	0.4850	395	0.0250
5512	Head	67	4	0.4452	0.4452	1,002	0.0692
5514	Head	78	5	0.5433	0.5433	187	0.0106
5517	Head	97	259	40.4022	6.1272	2,994	0.0150
5515	Leaves	97	259	11.4748	5.5648	6,757	0.0373
5518	Root	97	52	2.1397	2.1397	2,598	0.0373
5517G	Grain	97	259	20.5	10	4,184	0.0129
5517C	Chaff	97	—	—	3.7	1,716	0.0143

Table D-132

## PLANT UPTAKE SUMMARY: WHEAT

Soil: SAND Container Number: 20  
 Radionuclide: RU-106 Date Planted: July 8, 1965  
 Initial Soil Activity (c/m/gm): 6,855 Date Emerged: July 12, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
2003	Shoot	11	5	0.1422	0.1422	252	0.258
2004	Shoot	20	5	0.7473	0.7473	420	0.0820
2005	Shoot	27	10	2.0415	2.0415	1,283	0.0917
2006	Shoot	32	60	11.0750	11.0750	2,285	0.0301
2007	Stalk	36	15	4.0345	4.0345	662	0.0239
2008	Stalk	47	5	5.0591	5.0591	460	0.0133
2010	Stalk	54	6	5.2108	5.2108	2,029	0.0568
2012	Stalk	61	5	4.9990	4.9990	1,597	0.0466
2014	Stalk	70	5	3.5825	3.5825	894	0.0364
2016	Stalk	81	5	2.8702	2.8702	777	0.0395
2019	Stalk	88	217	131.1392	9.0492	2,974	0.0479
2009	Head	47	5	1.3107	1.3107	7	0.000779
2011	Head	54	6	1.3241	1.3241	150	0.0165
2013	Head	61	5	2.4773	2.4773	192	0.0113
2015	Head	70	5	1.5739	1.5739	64	0.00593
2017	Head	81	5	3.2805	3.2805	228	0.0101
2020	Head	88	217	176.7310	24.1110	631	0.00382
2018	Leaves	88	217	22.7655	5.7555	7,072	0.179
2021	Root	88	47	7.2935	7.2935	47,289	0.946
2020G	Grain	88	217	112.8033	10.6033	--	--
2020C	Chaff	88	--	--	5.9498	122	0.00299

Table D-133

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM

Radionuclide: RU-106

Initial Soil Activity (c/m/gm): 7,284

Container Number: 19

Date Planted: July 8, 1965

Date Emerged: July 14, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
1903	Shoot	11	5	0.0988	0.0988	66	0.0917
1904	Shoot	20	5	0.5373	0.5373	293	0.0749
1905	Shoot	27	5	0.7109	0.7109	325	0.0628
1906	Stalk	36	14	2.1893	2.1893	243	0.0152
1907	Stalk	47	5	2.9108	2.9108	116	0.00547
1909	Stalk	54	9	5.8478	5.8478	280	0.00657
1911	Stalk	61	5	3.5686	3.5686	96	0.00369
1913	Stalk	70	5	4.2020	4.2020	24	0.000784
1915	Stalk	81	5	2.3911	2.3911	210	0.0121
1918	Stalk	104	207	74.5700	9.8000	1,004	0.0141
1908	Head	47	5	1.2605	1.2605	6	0.000654
1910	Head	54	9	2.6431	2.6431	107	0.00556
1912	Head	61	5	2.0163	2.0163	53	0.00361
1914	Head	70	5	4.3648	4.3648	39	0.00123
1916	Head	81	5	3.4502	3.4502	35	0.00139
1919	Head	104	207	191.5785	30.7885	436	0.00194
1917	Leaves	104	207	17.0083	5.1183	2,783	0.0746
1920	Root	104	82	4.9769	4.9769	7,853	0.217
1919G	Grain	104	207	134.6493	12.2493	--	--
1919C	Chaff	104	--	--	6.5470	41	0.000860



Table D-134

## PLANT UPTAKE SUMMARY: WHEAT

Soil: SAND

Container Number: 45

Radionuclide: ZR-NB-95

Date Planted: July 15, 1965

Initial Soil Activity (c/m/gm): 72,070

Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
4503	Shoot	13	5	0.2716	0.2716	273	0.0139
4504	Shoot	20	10	0.8645	0.8645	2,180	0.0350
4505	Shoot	25	60	3.9600	3.9600	9,286	0.0325
4506	Stalk	29	27	2.0094	2.0094	2,010	0.0139
4507	Stalk	40	8	3.6970	3.6970	624	0.00234
4508	Stalk	48	6	3.0159	3.0159	3,795	0.0174
4510	Stalk	54	5	2.7060	2.7060	116	0.000595
4512	Stalk	63	5	3.2025	3.2025	164	0.000711
4514	Stalk	75	5	2.4932	2.4932	81	0.000451
4517	Stalk	84	360	156.3865	10.7175	2,463	0.00319
4509	Head	48	6	1.0777	1.0777	0	0
4511	Head	54	5	1.0627	1.0627	47	0.000614
4513	Head	63	5	1.3047	1.3047	8	0.000819
4515	Head	75	5	1.6390	1.6390	19	0.000161
4518	Head	84	360	161.6850	20.4050	542	0.000369
4516	Leaves	84	360	25.2659	7.1359	30,240	0.0588
4519	Root	84	58	11.9607	5.6807	102,734	0.251

Table D-135

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM

Container Number: 46

Radionuclide: ZR-NB-95

Date Planted: July 15, 1965

Initial Soil Activity (c/m/gm): 76,240

Date Emerged: July 19, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
4603	Shoot	13	5	0.1970	0.1970	283	0.0188
4604	Shoot	20	9	0.8042	0.8042	1,016	0.0166
4605	Stalk	29	17	2.0769	2.0769	1,199	0.00757
4606	Stalk	40	14	5.2520	5.2520	366	0.000914
4607	Stalk	48	5	2.9235	2.9235	129	0.000578
4609	Stalk	54	5	3.3847	3.3847	121	0.000469
4611	Stalk	63	5	3.2341	3.2341	341	0.00138
4613	Stalk	75	5	2.6414	2.6414	12	0.000060
4616	Stalk	97	348	114.3100	9.4800	2,667	0.00369
4608	Head	48	5	1.2209	1.2209	25	0.000269
4610	Head	54	5	1.3357	1.3357	0	0
4612	Head	63	5	2.3040	2.3040	42	0.000239
4614	Head	75	5	2.8660	2.8660	0	0
4617	Head	97	348	205.9090	23.1590	820	0.000464
4615	Leaves	97	348	13.1720	6.140	10,734	0.0229
4618	Root	97	91	4.8625	4.8625	44,526	0.120
4617G	Grain	97	348	122.8819	12.4814	--	--
4617C	Chaff	97	--	--	5.3084	885	0.00219

Table D-136

## PLANT UPTAKE SUMMARY: WHEAT

Soil: SAND

Radionuclide: CE-144

Initial Soil Activity (c/m/gm): 7,326

Container Number: 30

Date Planted: July 8, 1965

Date Emerged: July 13, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
3003	Shoot	11	5	0.1162	0.1162	114	0.134
3004	Shoot	20	5	0.3389	0.3389	234	0.0942
3005	Shoot	27	10	1.4763	1.4763	1,039	0.0961
3006	Shoot	32	60	6.3673	6.3673	3,374	0.0723
3007	Stalk	36	16	2.5940	2.5940	1,095	0.0576
3008	Stalk	46	5	3.3198	3.3198	67	0.00276
3010	Stalk	54	5	3.8663	3.8663	92	0.00325
3012	Stalk	61	5	5.8701	5.8701	64	0.00149
3014	Stalk	70	4	5.3354	5.3354	51	0.00130
3016	Stalk	81	5	3.5778	3.5778	308	0.0118
3019	Stalk	88	320	177.4233	8.3533	281	0.00459
3009	Head	46	5	1.1872	1.1872	5	0.000575
3011	Head	54	5	1.5854	1.5854	0	0
3013	Head	61	5	2.1758	2.1758	0	0
3015	Head	70	4	3.0664	3.0664	0	0
3017	Head	81	5	4.8536	4.8536	41	0.00115
3020	Head	88	30	295.7445	36.4545	0	0
3018	Leaves	88	320	12.9160	4.7060	2,191	0.0636
3021	Root	88	57	10.0315	5.1515	19,608	0.520
3020G	Grain	88	320	177.0713	12.9213	--	--
3020C	Chaff	88	--	--	7.4236	37	0.000680

Table D-137

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM

Container Number: 31

Radionuclide: CE-144

Date Planted: July 8, 1965

Initial Soil Activity (c/m/gm): 7,326

Date Emerged: July 14, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
3103	Shoot	11	5	0.0922	0.0922	242	0.358
3104	Shoot	20	5	0.3226	0.3226	121	0.0512
3105	Shoot	27	10	1.1565	1.1565	983	0.116
3106	Shoot	32	40	4.5300	4.5300	267	0.00804
3107	Stalk	36	24	4.3669	4.3669	250	0.00782
3108	Stalk	46	5	2.7799	2.7799	57	0.00280
3110	Stalk	54	6	4.4572	4.4572	53	0.00162
3112	Stalk	61	5	3.9395	3.9395	118	0.00409
3114	Stalk	70	5	3.5090	3.5090	56	0.00218
3116	Stalk	81	5	4.3130	4.3130	150	0.00475
3119	Stalk	104	338	147.6984	11.2684	240	0.00291
3109	Head	46	5	1.0500	1.0500	19	0.00247
3111	Head	54	6	1.4551	1.4551	0	0
3113	Head	61	5	1.4148	1.4148	0	0
3115	Head	70	5	2.0211	2.0211	21	0.00142
3117	Head	81	5	4.1439	4.1439	36	0.00119
3120	Head	104	338	335.5800	34.9000	118	0.000462
3118	Leaves	104	338	26.9082	8.0582	1,211	0.0205
3121	Root	104	83	6.9590	6.9590	8,474	0.166
3120G	Grain	104	338	257.6685	14.1685	--	--
3120C	Chaff	104	—	—	6.0218	--	--

Table D-13M

## PLANT UPTAKE SUMMARY: WHEAT

Soil: CLAY

Radionuclide: CK-144

Initial Soil Activity (c/m/gm): 7,702

Container Number: 20

Date Planted: July 8, 1965

Date Emerged: July 14, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>a</sup> SU
2903	Shoot	11	5	0.0755	0.0755	58	0.0997
2904	Shoot	20	5	0.6266	0.6266	662	0.137
2905	Shoot	27	5	0.8450	0.8450	605	0.0930
2906	Stalk	36	14	2.6524	2.6524	367	0.0180
2907	Stalk	46	5	1.5458	1.5458	218	0.0183
2909	Stalk	54	5	1.6618	1.6618	72	0.00563
2911	Stalk	70	3	1.0015	1.0015	130	0.0168
2914	Stalk	79	177	31.1285	10.0785	603	0.00774
2908	Head	46	5	0.4819	0.4819	0	0
2910	Head	54	5	0.9364	0.9364	0	0
2912	Head	70	3	1.5953	1.5953	20	0.00204
2915	Head	79	177	73.0048	14.5748	277	0.00246
2913	Leaves	79	177	10.1651	10.1651	2,371	0.0302
2916	Root	79	73	2.1162	2.1162	5,701	0.348
2915G	Grain	79	177	41.1250	15.0250	16	0.000138
2915C	Chaff	79	--	--	5.7474	162	0.00366

Table D-139

## PLANT UPTAKE SUMMARY: WHEAT

Soil: SAND  
 Radionuclide: Control  
 Initial Soil Activity (c/m/gm): —

Container Number: 102  
 Date Planted: July 23, 1965  
 Date Emerged: July 27, 1965

Sample Number	Plant Part	Age (days)	Number of Plants	Total Dry Weight (gram)	Counting Dry Weight (gram)	Activity (c/m)	<sup>3</sup> SU
10201	Shoot	12	5	0.1647	0.1647	28	
10202	Stalk	24	39	3.2042	3.2042	12	
10203	Stalk	34	30	5.2480	5.2480	5,288	
10204	Stalk	42	4	1.6753	1.6753	12	
10206	Stalk	55	5	2.6336	2.6336	6	
10208	Stalk	67	5	1.5029	1.5029	40	
10211	Stalk	80	384	147.6345	7.9545	37	
10205	Head	42	4	0.5417	0.5417	19	
10207	Head	55	5	0.9094	0.9094	0	
10209	Head	67	5	0.9392	0.9392	27	
10212	Head	80	384	107.5762	11.3362	266	
10210	Leaves	80	384	30.2547	4.4547	11	
10213	Root	80	87	11.1701	5.0701	110	

Table D-140

## PLANT UPTAKE SUMMARY: WHEAT

Soil: LOAM

Radionuclide: Control

Initial Soil Activity (c/m/gm): —

Container Number: 120

Date Planted: July 23, 1965

Date Emerged: July 30, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
12001	Stalk	24	25	1.4612	1.4612	16	
12002	Stalk	34	12	2.5971	2.5971	11	
12003	Stalk	42	4	1.6680	1.6680	44	
12005	Stalk	55	4	4.3385	4.3385	40	
12007	Stalk	67	5	3.3339	3.3339	22	
12010	Stalk	92	276	172.7582	11.1382	11	
12004	Head	42	4	0.5518	0.5518	29	
12006	Head	55	4	1.4275	1.4275	18	
12008	Head	67	5	1.6054	1.6054	30	
12011	Head	92	276	227.5555	18.8555	9	
12009	Leaves	92	276	40.8400	10.4600	47	
12012	Root	92	64	4.5136	4.5136	17	

Table D-141

## PLANT UPTAKE SUMMARY: WHEAT

Soil: CLAY

Radionuclide: Control

Initial Soil Activity (c/m/gm): --

Container Number: 101

Date Planted: July 23, 1965

Date Emerged: July 28, 1965

<u>Sample Number</u>	<u>Plant Part</u>	<u>Age (days)</u>	<u>Number of Plants</u>	<u>Total Dry Weight (gram)</u>	<u>Counting Dry Weight (gram)</u>	<u>Activity (c/m)</u>	<u><sup>a</sup>SU</u>
10101	Stalk	24	18	0.9708	0.0540	9	
10102	Stalk	34	12	1.7726	1.7726	0	
10103	Stalk	42	5	1.0330	1.0330	13	
10105	Stalk	55	5	1.7438	1.7438	16	
10107	Stalk	67	5	1.4471	1.4471	23	
10110	Stalk	87	325	70.7500	4.0500	0	
10104	Head	42	5	0.4373	0.4373	0	
10106	Head	55	5	0.8406	0.8406	9	
10108	Head	67	5	0.8505	0.8505	29	
10111	Head	87	325	70.2505	2.3505	0	
10109	Leaves	87	325	10.5106	3.4606	0	
10112	Root	87	36	2.7378	2.7378	0	



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13 ABSTRACT		
<p>The uptake of five radionuclides (Sr-85, Zr-Nb-95, Ru-106, Cs-137, and Ce-144) was measured for seven plants (bean, carrot, clover, lettuce, radish, tomato, and wheat) grown in three different soil types (sand, loam, and clay). Plants were grown in large soil containers that allowed most of the root system to develop under normal field conditions. Sampling started as soon as the plants sprouted and continued at frequent intervals depending on growth characteristics of the plant. Plant uptake contamination factors (<math>a_{su}</math>) were calculated for each of the samples harvested. Comparisons of the uptake for various plant part-soil-radionuclide combinations at crop maturity show that the <math>a_{su}</math> values for Sr-85 are the largest in all instances, usually by an order of magnitude. The <math>a_{su}</math> value for the edible portion of each plant was lowest in every case, and usually the leafy portion of the plant had the largest <math>a_{su}</math> value.</p>		

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**TITLE: Uptake of Radionuclides by Plants**

**By: James D. Sartor, William B. Lane, and  
Jere J. Allen**

**SUMMARY:**

The uptake of five radionuclides (Sr-85, Zr-Nb-95, Ru-106, Cs-137, and Co-144) was measured for seven plants (bean, carrot, clover, lettuce, radish, tomato, and wheat) grown in three different soil types (sand, loam, and clay). Plants were grown in large soil containers that allowed most of the root system to develop under normal field conditions. Sampling started as soon as the plants sprouted and continued at frequent intervals depending on growth characteristics of the plant. Plant uptake contamination factors (agU) were calculated for each of the samples harvested. Comparisons of the uptake for various plant part-soil-radionuclide combinations at crop maturity show that the agU values for Sr-85 are the largest in all instances, usually by an order of magnitude. The agU value for the edible portion of each plant was lowest in every case, and usually the leafy portion of the plant had the largest agU value.

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